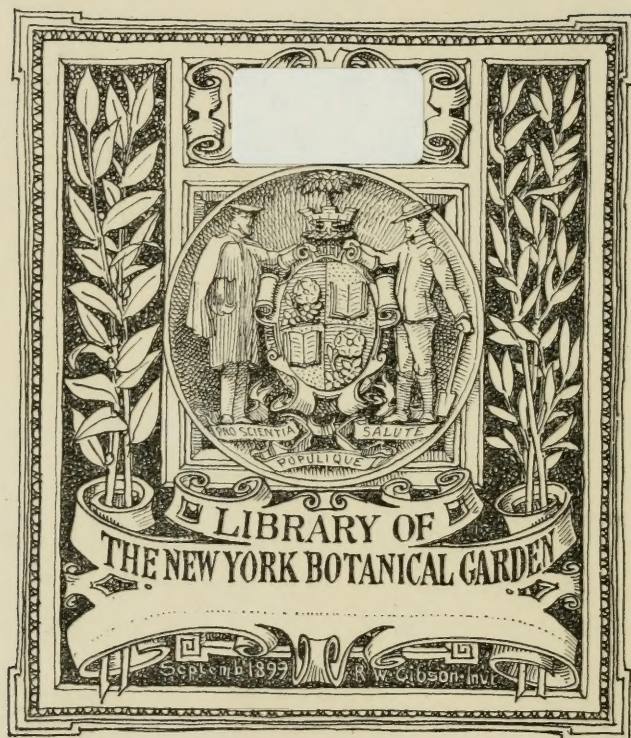


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FIFTEENTH ANNUAL REPORT
OF THE
SECRETARY
TO THE
STATE BOARD OF AGRICULTURE
OF THE
STATE OF MICHIGAN,
FOR THE YEAR ENDING SEPTEMBER 30, 1876.



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HON. MILTON J. GARD, of Cassopolis.

JOHN. J. BAGLEY, GOVERNOR OF THE STATE,

T. C. ABBOT, PRESIDENT AGRICULTURAL COLLEGE,

} *Ex Officio.*

ROBERT G. BAIRD, SECRETARY.

EPHRAIM LONGYEAR, of Lansing, TREASURER.

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REPORT OF THE SECRETARY
OF THE
STATE BOARD OF AGRICULTURE.

AGRICULTURAL COLLEGE, }
Lansing, November 10, 1876. }

To the Legislature of the State of Michigan:

I have the honor to submit herewith, to your Honorable Body, as required by statute, the accompanying Report for the year ending September 30, 1876, with supplementary papers.

Respectfully yours,

ROBERT G. BAIRD,
Secretary of Michigan State Board of Agriculture.

COLLEGE ACCOUNTS.

SECRETARY'S ACCOUNT

For the Year from December 1st, 1875, to September 30th, 1876.

Dr.

To balance on hand December 1st, 1875.....		\$331 55
Rec'd from State Treas. on acc't of interest.....	\$16,880 17	
current expense.....	7,138 00	
library.....	500 00	
buildings and repairs.....	2,575 00	
S. Works, etc.....	500 00	
safe for Secretary's office.....	300 00	
horticultural department ..	385 00	
stock, experiments, etc.....	425 00	
	<hr/>	28,703 17
Farm department receipts.....		3,646 81
Horticultural department receipts.....		694 15
Library receipts.....		122 44
Apiary receipts.....		93 37
Sale of swamp lands.....		1,773 09
Museum—freight on specimens returned.....		4 25
Boarding hall receipts, outside of students' board.....		873 94
Farm House—board of employes.....		1,016 51
From Students—		
on account of matriculation.....	\$390 00	
room rent.....	473 12	
incidentals.....	863 25	
chemicals.....	532 86	
board.....	7,344 69	
special examinations.....	20 00	
	<hr/>	9,523 92
Total.....		<hr/> <hr/> \$46,883 20

Cr.

By cash paid E. Longyear.....	\$46,605 63	
balance on hand.....	277 57	
	<hr/>	\$46,883 20

SUMMARY OF TREASURER'S ACCOUNT.

1875.	DR.	
Dec. 1.—To balance from old account.....		\$259 70
1876.		
Sept. 30.—Cash of Secretary and State Treasurer at sundry times.....		46,605 63
Total.....		<u>\$46,865 33</u>
1876.	CR.	
Sept. 30.—By paid warrants.....		\$44,335 08
By balance to new account.....		2,530 25
		<u>\$46,865 33</u>
1876.	DR.	
Oct. 1.—To balance from old account.....		<u>\$2,530 25</u>

E. LONGYEAR, *Treasurer.*

I certify that the above is a true copy of the summary of the report of the Treasurer of the State Board of Agriculture, and that the original report is on file in my office.

ROBERT G. BAIRD,
Secretary of State Board of Agriculture.

SUMMARY OF WARRANT ACCOUNT.

From Dec. 1, 1875, to Sept. 30, 1876.

Expenses of State Board.....		\$161 78
President's office.....		39 51
Secretary's office (books, stationery, postage, etc.).....	\$92 67	
Paid E. Marston as assistant.....	130 00	
Boxes, packing, shipping, etc.....	29 90	
		<u>252 57</u>
Advances refunded.....		337 99
Salaries (not including hired men).....		17,588 89
Sunday services.....		105 00
Centennial expenses.....		135 27
Cuts for Report.....		40 25
Printing.....		661 05
Farmers' Institutes (expenses).....		137 81
College hall (fuel, etc.).....		155 97

COLLEGE ACCOUNTS.

9

Board of farm foreman and assistant.....		304 29
Washing for employes and miscellaneous.....		51 92
Students' labor—		
carrying mail.....	\$30 80	
other labor (paid by warrant).....	2 85	
		33 65
Incidental expenses—		
Balance on compass.....	\$20 00	
P. O. drawer rent.....	4 00	
paid detective for service.....	8 52	
repairing telescope.....	1 00	
		33 52
Safe for Secretary's office—		
special appropriation.....	\$300 00	
freight, cartage, and placing in office.....	39 11	
		339 11
Steam works, boarding hall furniture and repairs.....		844 09
Vacation account, boarding hall.....		406 45
Board of Students—		
Indebtedness of 1875.....	\$1,456 92	
Disbursements of 1876.....	11,510 91	
		12,967 83
Farm Department—		
Indebtedness of 1875.....	\$287 73	
Disbursements of 1876.....	2,119 16	
		2,406 89
Horticultural Department—		
Indebtedness of 1875.....	\$109 60	
Special appropriation.....	599 80	
Disbursement of Hort. Department, current expense.....	1,193 09	
		1,902 49
Farm House—		
Indebtedness of 1875.....	\$87 29	
Disbursements of 1876.....	1,011 02	
		1,098 31
Library—		
Current expense.....	\$45 21	
Special appropriation.....	680 51	
		725 72
Museum.....		266 62
Apiary.....		122 09
Chemical Department—		
Special appropriation.....	\$313 15	
Laboratory current expense, chemicals, fuel, etc.....	428 68	
		741 83
Stock, Experiments, and Farm Improvements—		
Indebtedness of 1875.....	\$60 00	
Disbursements of 1876.....	1,105 19	
		1,165 19
Buildings and repairs.....		1,318 99
		<u>\$44,335 08</u>

DEPARTMENT ACCOUNTS.

FARM DEPARTMENT.

Dr.

To disbursements on account of current expense—

labor, hired hands.....	\$882 73
board of farm hands.....	493 43
implements.....	72 29
repairs of implements.....	118 46
cattle.....	141 58
sheep.....	16 40
pigs.....	61 16
teams.....	122 42
toll.....	6 56
seeds.....	107 96
hardware.....	17 83
office.....	20 00
lumber.....	9 16
produce.....	27 15
miscellaneous.....	22 03

\$2,119 16

Disbursements on account of stock, etc. (special appropriation.)

purchase of team.....	300 00
“ “ pigs.....	250 00

Students' labor.....\$2,819 32

Bills payable.....149 57

\$5,638 05

By cash receipts—

Cr.

on account of sale of cattle.....	\$341 00
milk and butter.....	708 83
hides and beef.....	225 39
use of stock.....	102 50
sheep.....	466 15
pigs.....	741 50
produce.....	390 64
wood.....	317 84
labor (men and team).....	117 05
seeds.....	97 50
students' labor.....	98 44
timber.....	21 92
stone.....	6 00
teaming.....	4 00
compost.....	2 88
posts.....	2 10
lumber.....	1 87
hardware.....	1 00
toll.....	20

\$3,646 81

* Bills receivable.....1,717 36

Increase of inventory.....1,194 06

Transfer of inventory.....70 00

Profit to balance.....\$990 18

\$6,628 23

\$6,628 23

* Of this amount, \$1,228 00 dollars, is accredited to the Farm Department for grading and ditching on the new grade around the President's and Professors' houses on the west side of the College grounds, the remainder is bills for produce sold.

HORTICULTURAL DEPARTMENT.

Dr.

To disbursements on account of—	
greenhouse (current expense).....	\$459 22
" appropriation for painting.....	86 35
" " plants.....	20 50
vegetable garden.....	50 42
grounds.....	7 90
nursery.....	13 47
orchard.....	26 96
vine yard.....	25 00
fertilizers.....	68 59
team.....	495 62
office.....	12 69
tools and implements.....	98 69
labor (hired men).....	238 16
herbarium.....	8 40
lumber.....	1 87
board of employés.....	149 45
miscellaneous.....	29 60
	<hr/>
	\$1,792 89
students' labor (including care of grounds).....	1,235 35
error of published inventory of 1875.....	415 00
bills payable.....	31 33
	<hr/>
	\$3,474 57

Cr.

By cash receipts on account of—		
greenhouse.....	\$288 24	
vegetable garden.....	294 30	
labor.....	27 07	
orchard.....	4 34	
hay sold.....	7 25	
payment on horse.....	42 00	
teaming.....	31 95	
	<hr/>	
	\$694 15	
increase of inventory.....	2,081 42	
* bills receivable.....	275 53	
balance.....	433 45	
	<hr/>	
	\$3,474 57	\$3,474 57
	<hr/>	<hr/>

FARM HOUSE.

Dr.

To cash disbursements.....	\$1,011 02
bills payable.....	26 83
decrease in inventory.....	11 93
	<hr/>
	\$1,049 78

Cr.

By cash receipts on account of board of employés, 296 2-7 weeks	
at \$3.43.....	\$1,016 51
bills receivable.....	80 85
To balance.....	47 58
	<hr/>
	\$1,097 36
	<hr/>
	\$1,097 36

* Of this amount \$175 54 is a credit for labor performed outside of the department, the remainder is bills against individuals for articles sold by the department.

STATE BOARD OF AGRICULTURE.

CHEMICAL DEPARTMENT.

Dr.

To cash disbursements (special appropriation).....	\$313 15
" " current expense.....	428 68

Cr.

By cash receipts from students' fees.....		\$532 86
*increase of inventory.....		446 15
To balance.....	237 18	
	<u>\$979 01</u>	<u>\$979 01</u>

LIBRARY.

Dr.

To cash disbursements (special appropriation).....	\$680 51
" " current expenses.....	45 21
bills payable.....	29 55
students' labor.....	63 30
	<u>\$818 57</u>

Cr.

By cash receipts.....		\$122 44
increase of inventory.....		1,638 08
To balance.....	941 95	
	<u>\$1,760 52</u>	<u>\$1,760 52</u>

The above increase of inventory of College Library, it will be seen, is greater than the total amount expended during the year. It includes the following:

Books purchased during the year.....	\$658 78
Donations.....	75 00
Exchanges through the Secretary of the College.....	11 00
Herd books, 47 volumes, transferred from farm department and valued at.....	320 00
Furniture not given in last year's inventory.....	155 50
Maps, paintings, etc., " " ".....	175 00
Text books and hymn books for sale.....	242 80
	<u>\$1,638 08</u>

MUSEUM.

Dr.

To cash disbursements.....	\$266 62
students' labor.....	14 59

Cr.

By cash receipts.....		
freight on specimens returned.....		\$4 25
increase of inventory (by purchase and donations).....		478 15
To balance.....	201 19	
	<u>\$482 40</u>	<u>\$482 40</u>

APIARY.

Dr.

To cash disbursements.....	\$122 09
students' labor.....	30 26
	<u>\$152 35</u>

* Includes stock for remainder of college year.

	CR.	
By cash receipts.....		\$93 37
increase of inventory.....		337 47
To balance.....	\$278 49	
	<u>\$430 84</u>	<u>\$430 84</u>

STUDENTS' LABOR.

During that portion of the college year included in this report (to Sept. 30th) the students have been credited with 45,808 hours' labor. The maximum rate per hour is 10 cents. The average price per hour throughout the year has been 9.745+ cents, and the amounts charged to different departments are as follows:

Farm department.....	\$2,819 32
Horticultural department.....	1,235 35
President's office.....	38 67
Secretary's office.....	40 49
Library.....	63 30
Apiary.....	30 26
Bell.....	50 10
Organ.....	18 40
Museum.....	14 59
Mail.....	65 20
College hall.....	78 00
Map of grounds.....	10 50
	<u>\$4,464 18</u>

BOARD.

The summary of warrant account shows the disbursements on account of board, and the Secretary's account shows the amount of cash received from students on account of board till Sept. 30. Students are boarded at cost. The cash received from them on account of board is simply the balance which they are indebted to board after being credited with the amount of their labor. Board, including fuel, cost during the first term \$3.15; during the second term, \$2.70 per week; the last term (not yet closed) the cost of board will probably be something less than the first, and more than the second term.

INVENTORY.

As required by statute the inventories are published in detail.

The total amount of property as per inventory taken Sept. 30, 1876.....	\$256,105 11
The total amount of property as per inventory December 1st, 1875.....	240,861 75
Increase.....	<u>\$15,243 36</u>

STATE BOARD OF AGRICULTURE.

GENERAL ACCOUNT.

Dr.

To disbursements (special appropriation).....	\$5,488 35
" (current expense).....	38,846 73
bills payable.....	1,914 00

Cr.

By increase of inventory.....	\$15,243 36	
cash in College treasury.....	2,530 25	
" with Secretary.....	277 57	
" * in State 'Treas. on account of special appropriations.....	2,020 50	
bills receivable.....	2,292 89	
current expenses to balance.....	33,884 51	
	<u>\$46,249 08</u>	<u>\$46,249 08</u>

* The State Board of Agriculture soon after the close of the fiscal year, made arrangements for the expenditure of the balances remaining in the State Treasury on account of special appropriations, and if the work can be done these balances will be all expended before the close of the calendar year.

GENERAL INVENTORY.

INVENTORY OF BUILDINGS.

College hall	\$15,000 00	
Chemical laboratory	12,000 00	
New boarding hall	45,000 00	
Old boarding hall	15,000 00	
Farm house	3,500 00	
Three brick cottages	9,000 00	
One brick cottage	4,275 00	
Herdsmen's cottage	600 00	
Six barns at Professors' houses	1,800 00	
New barn and shed, horticultural department	500 00	
Cattle barn and shed	3,200 00	
Sheep barn	2,500 00	
Horse barn	3,000 00	
Piggery	2,000 00	
Brick work shop	600 00	
Garden barn	600 00	
Blacksmith shop, tool house, feeding house, etc.	400 00	
Windmill and water supply	500 00	
Three new houses	20,728 00	
Green house	8,000 00	
Bee house	280 00	
		\$148,483 00

INVENTORY OF FARM.

676 acres, @ \$70	\$47,320 00
-------------------------	-------------

INVENTORY OF FARM DEPARTMENT.

Machines.

1 Howell sawing machine with power	\$150 00	
1 Challenge feed mill	125 00	
1 Tread Power with sawing attachment	190 00	
1 Hardor's Combined Thresher	225 00	
1 Parish stump machine	100 00	
1 Power Cutter (Fulton Manufacturing Co.)	40 00	
1 Empire Hand Cutter	5 00	
1 Root Pulper, Bental's patent	50 00	
1 " " Biddle's "	40 00	
1 slicer	3 00	
1 Excelsior root cutter	2 00	
1 Little Giant corn sheller	8 00	
1 old corn sheller	4 00	
		\$942 00

Fanning Mills.

1 A. P. Dikey's	\$25 00	
1 John Allen's	25 00	
1 J. Nall	25 00	
		75 00

Amount carried forward	\$1,017 00
------------------------------	------------

Seed Drills.

Amount of F. D. Inventory brought forward.....		\$1,017 00
1 Brown seed drill.....	\$50 00	
1 Beckwith roller drill.....	75 00	
1 Harrington hand drill, for turnips.....	5 00	
1 Holbrook's " " " ".....	10 00	
1 Broadcast Wheelbarrow Sower.....	10 00	

150 00

Hay Tedders.

1 American.....	\$15 00	
1 Bullard's.....	10 00	

25 00

Horse Hay Rakes.

2 Bay State rakes.....	30 00	
1 old rake.....	5 00	

35 00

Mowers and Reapers.

1 Gregg.....	10 00	
1 Combined Buckeye, Sr.....	25 00	
1 Clipper mower.....	80 00	
1 N. Y. reaper.....	50 00	

165 00

Planters.

1 Wakefield planter.....	10 00	
2 Hand planters.....	6 00	

16 00

Scrapers.

1 broad scraper for ditch.....	10 00	
1 narrow scraper.....	8 00	
1 old scraper.....	2 00	

20 00

Plows.

1 Gale plow.....	16 00	
1 Wolverine plow, Ann Arbor.....	16 00	
1 Ball plow.....	2 00	
1 Oliver chilled plow.....	16 00	
1 Gowanda plow.....	5 00	
1 Curtis, No. 4.....	3 00	
1 Dodge, No. 20.....	3 00	
2 Side-hill plows.....	30 00	
3 iron plows.....	6 00	
1 wooden beam plow, old.....	2 00	
1 iron beam plow.....	2 00	

101 00

Cultivators.

1 Battle Creek cultivator with drag attachment.....	40 00	
2 wheel cultivators, old.....	20 00	
1 two-horse hoe.....	10 00	
1 45-tooth iron harrow.....	25 00	
1 common iron harrow.....	12 00	
1 A harrow.....	2 00	
1 new wooden harrow.....	5 00	
1 old " ".....	3 00	
1 single horse hoe.....	5 00	
2 5-tooth one-horse cultivators.....	8 00	
1 iron frame 3-tooth ".....	2 00	
2 double shovel plows.....	10 00	
4 3-tooth corn cultivators.....	4 00	
1 A, 2-horse cultivator.....	2 00	
2 A drags.....	2 00	
1 single shovel plow.....	3 00	
1 hand turnip cultivator.....	3 00	

156 00

Amount carried forward..... \$1,685 00

COLLEGE ACCOUNTS.

17

Amount of F. D. Inventory brought forward..... \$1,685 00

CARPENTER'S TOOLS.

Saws.

6 cross cut saws.....	\$10 00
1 rip saw.....	25
1 back saw.....	50
6 hand saws.....	8 00
1 " saw, new.....	75
1 buck saw plate.....	25

19 75

Planes.

1 long jointer.....	\$2 00
2 short jointers.....	2 50
2 jack planes.....	1 00
2 smoothing planes.....	1 25
2 moulding planes.....	3 00
1 set plows.....	7 00
1 rabbet plane.....	2 00
1 set matching planes.....	3 00

21 75

Hammers.

5 nail hammers.....	\$3 00
1 spike hammer.....	1 00
1 tile ".....	1 00
2 stone hammers.....	3 00
1 sledge.....	50

8 50

Miscellaneous.

1 broad axe.....	\$3 00
1 hand axe.....	50
1 adz.....	2 00
4 squares.....	5 00
2 try squares.....	1 00
4 bit stocks.....	80
31 bit augers, $\frac{1}{2}$ inch and less.....	1 20
2 rimmers.....	30
2 Clark's expansion bits.....	1 70
1 2-inch auger.....	1 25
2 $1\frac{1}{2}$ -inch augers.....	2 00
1 1-inch auger.....	75
1 $2\frac{1}{2}$ -inch auger.....	1 25
5 small monkey wrenches.....	1 25
1 large " wrench.....	1 00
1 draw shave.....	1 00
1 spoke ".....	50
1 pair extension compasses.....	75
1 " small compasses.....	25
3 small gauges.....	75
1 slitting gauge.....	1 00
2 screw drivers for bit.....	25
1 large screw driver, hand.....	50
1 small " ".....	20
1 bevel square.....	25
14 chisels, 2 inch to $\frac{1}{8}$ inch.....	7 00
2 gouges, 1 and $1\frac{1}{4}$ inch.....	1 25
1 oil stone.....	50
2 nail sets.....	25
1 wooden screw cutter.....	50
7 small plane irons.....	2 00
1 awl holder.....	30
1 large saw-set, Leache's patent.....	1 00
3 small saw-sets.....	2 25
3 work benches and vises.....	3 00

Amount carried forward..... \$1,735 00

Amount of F. D. Inventory brought forward		\$1,735 00
1 saw holder for filing	\$2 00	
2 chalk lines	60	
3 small files	25	
2 large files	40	
2 iron punches	25	
1 leather punch	15	
1 scratch awl	10	
1 steel bit punch	25	
5 nail boxes	50	
		51 00
<i>Scales.</i>		
1 set Fairbank's platform hay	\$75 00	
1 set truck scales	25 00	
1 set desk scales	12 00	
		112 00
<i>Blacksmiths' Tools.</i>		
2 cold chisels	\$0 25	
1 key set	13	
2 iron vises	12 00	
3 pair tongs	1 50	
1 drill stock	2 00	
1 set dies and taps	10 00	
3 pair pinchers	1 50	
2 hammers	1 75	
2 rasps	1 50	
1 buttress	1 00	
1 bellows	3 00	
1 tire rimmer	50	
1 riveting hammer	75	
1 pair tongs	75	
		36 65
<i>Masons' Tools.</i>		
1 brick trowel	\$0 75	
2 square trowels	1 50	
1 plumb	10	
1 mason's screen	5 00	
2 " hoes	1 50	
1 spirit level	2 00	
		10 85
<i>Chains.</i>		
14 old trace chains	\$0 50	
19 trace chains for calves	4 00	
29 cow chains	5 00	
4 bull "	1 00	
6 log chains	10 00	
		20 50
<i>Hardware.</i>		
7 plow bolts	\$0 70	
120 bolts, assorted sizes	2 50	
7 catches for doors	35	
1 lb. copper rivets	75	
2 lb. screws, all sizes	1 00	
1/2 doz. cockeyes	1 00	
1 door fastener	75	
9 Oliver chilled plow points	5 90	
6 Wolverine " "	3 00	
4 Dodge plow points	2 00	
1 set gate castings, self opener	10 00	
50 lbs. nails	2 00	
1 iron pump	3 00	
4 snaps	30	
4 iron pulleys	1 00	
		34 25
Amount carried forward		\$2,000 23

COLLEGE ACCOUNTS.

19

Amount of F. D. Inventory brought forward.....		\$2,000 23
<i>Ladders.</i>		
1 25-foot ladder.....	\$3 00	
1 15 " ".....	1 00	
1 12 " ".....	1 00	
		5 00
<i>Bull Frames.</i>		
1 bull frame.....	\$8 00	
		8 00
<i>Harness, etc.</i>		
1 set new harness.....	\$34 00	
2 set double harness, worn.....	50 00	
2 cart harnesses.....	68 00	
2 new collars.....	5 50	
7 halters.....	3 50	
4 bull halters.....	4 00	
4 surcingles.....	1 00	
3 pair horse blankets.....	6 00	
2 " " old.....	1 50	
1 bull blanket.....	1 35	
18 calf straps.....	7 00	
6 bull ".....	6 00	
20 feet rubber hose for barn.....	4 00	
3 hame straps.....	60	
1 whip.....	1 25	
		19 70
<i>Wagons, etc.</i>		
1 new wagon.....	\$90 00	
1 iron axle wagon.....	20 00	
2 old wagons.....	35 00	
2 1-horse carts.....	100 00	
2 hand carts.....	18 00	
1 swill cart.....	5 00	
1 land roller.....	15 00	
3 hay racks.....	22 00	
3 wood racks.....	3 00	
1 marker.....	5 00	
2 stone boats.....	2 00	
1 new stone boat.....	5 00	
2 wheel-barrows.....	4 00	
1 land plauer.....	4 00	
4 neck yokes.....	5 00	
3 set doubletrees.....	6 00	
3 singletrees.....	50	
1 iron for 3-horse evener.....	2 00	
1 work bench.....	1 00	
		342 50
<i>Hand Implements.</i>		
22 hand rakes.....	\$2 30	
53 common hoes.....	13 25	
3 grub hoes.....	3 00	
59 axes.....	39 33	
1 triangular hoe.....	75	
17 common pails.....	5 00	
2 tin pails and dippers.....	1 00	
2 " " new.....	2 00	
1 large scoop shovel.....	1 00	
1 small " ".....	50	
2 new " ".....	3 25	
6 curry combs.....	1 50	
1 " comb, rubber.....	75	
5 brushes.....	2 50	
3 cards.....	60	
5 brooms.....	1 00	
Amount carried forward.....		\$2,549 43

Amount of F. D. Inventory brought forward.....		\$2,549
1 2-bushel basket.....	\$0 50	
1 1/2 " ".....	70	
2 1 " ".....	75	
1 1/2 " ".....	25	
20 long handled pitch-forks.....	10 00	
7 " " dung-forks.....	3 50	
12 " " ".....	6 00	
6 Partridge forks, short handles.....	4 50	
6 long handled shovels.....	3 00	
15 short " ".....	6 50	
5 long " spades, \$1.25.....	6 25	
37 short " ".....	46 25	
2 spades.....	2 00	
1 barley fork.....	1 00	
8 horse hay forks, different patents.....	80 00	
1 harpoon fork, cable and pulleys.....	15 00	
2 hay knives.....	1 50	
3 grain cradles.....	4 00	
1 wrought iron hook and pulley.....	1 50	
2 ice tongs.....	3 00	
6 scythes and snaths.....	8 00	
6 bush scythes.....	9 00	
2 crow bars.....	3 00	
4 scythes and snaths, old.....	2 00	
28 corn knives.....	5 60	
4 sickles, for corn.....	1 00	
14 iron tooth rakes.....	14 00	
14 manure and root hooks.....	7 00	
2 potato hooks.....	60	
1 set drain tools.....	10 00	
1 drain scoop.....	1 00	
1 12-inch sewer tile.....	50	
1/2 doz. lines.....	50	
2 screw presses.....	4 00	
40 husking pegs.....	1 00	
7 picks and handles.....	7 00	
3 handles.....	75	
1 iron maul.....	1 00	
5 beetles.....	2 50	
8 iron wedges.....	1 00	
3 hog hooks.....	50	
3 butcher knives.....	1 50	
3 T's for rail fence.....	50	
2 bull staves.....	2 00	
6 " ropes.....	1 50	
2 ox muzzles.....	50	
2 ox yokes.....	10 00	
2 " small.....	7 00	
2 bull rings.....	1 50	
1 cattle ear punch.....	2 00	
1 " injector.....	1 00	
1 Rockwell bag-holder.....	1 00	
1 wool box.....	3 00	
1 sheep ear-punch.....	1 00	
1 hog ringer.....	1 00	
1 pair sheep hoof shears.....	1 00	
3 " " shears.....	3 00	
1 box for dipping lambs.....	3 00	
<i>Drain Tools.</i>		394 38
5 boning rods.....	\$1 25	
8 pair shears.....	90	
3 measuring rods.....	50	
		2 65
Amount carried forward.....		\$2,946 46

COLLEGE ACCOUNTS.

21

Amount of F. D. Inventory brought forward.....		\$2,946 46	
<i>Sleighs.</i>			
1 long sleigh.....	\$5 00		
2 pair bobs.....	30 00		
			35 00
<i>Miscellaneous.</i>			
72 grain bags.....	\$21 60		
$\frac{2}{3}$ barrel salt.....	1 00		
2 gallons lubricating oil.....	1 00		
1 set treads for power.....	5 00		
50 lbs. middlings.....	1 20		
$\frac{2}{3}$ barrel calcined plaster.....	75		
1,000 feet lumber, various kinds.....	14 00		
500 " " hard wood.....	8 00		
			52 55
<i>Medicines.</i>			
3 lbs. ginger.....	\$1 20		
2 lbs. epsom salts.....	20		
1 pint arnica.....	30		
2 oz. laudanum.....	30		
1 qt. carbolic acid dilute.....	25		
1 pt. " " crystals.....	50		
			2 75
<i>Miscellaneous.</i>			
1 set pedigree cards for stock.....	\$6 00		
1 padlock and hasp.....	50		
1 part bunch picture cord.....	25		
1 paper tacks.....	10		
1 " screws.....	15		
1 small whetstone.....	10		
2 sponges.....	50		
3 oil cans for machinery.....	40		
1 glue pot.....	75		
1 doz. old picture frames.....	1 20		
1 small marking brush.....	15		
1 bunch brad nails.....	10		
1 syringe.....	50		
1 set stencils.....	50		
rivets for mower.....	50		
4 lamp chimneys.....	40		
1 piece harness leather.....	1 00		
1 carpenter's chest.....	2 00		
2 pair cattle tongs.....	75		
2 boxes axle grease.....	40		
2 half bushels.....	1 00		
2 peck measures.....	50		
1 4-qt. measure.....	25		
5 2 " ".....	1 00		
1 oil keg.....	1 00		
			20 00
<i>Furniture, Stationery, etc.</i>			
1 coal stove and pipe.....	\$35 00		
6 arm chairs.....	6 00		
2 old ".....	50		
1 rocking chair.....	2 50		
1 secretary and table.....	5 00		
1 set drafting instruments.....	2 00		
1 parallel ruler.....	50		
2 lamps.....	2 00		
1 duster.....	10		
1 pen stand.....	40		
1 ink-stand.....	30		
1 stove and pipe in shop.....	10 00		
$\frac{1}{2}$ gross pens.....	25		
Amount carried forward.....			\$3,056 76

Amount of F. D. Inventory brought forward.....		\$3,056 76
4 pencils.....	\$0 20	
900 envelopes.....	2 70	
800 half sheet note heads.....	3 20	
9 pieces isinglass for stove.....	90	
1 wash-bowl and pitcher.....	1 00	
6 towels.....	1 00	
1 120-gal. caldron and stove.....	40 00	
1 12 " " " for tar.....	3 00	
2 grindstones and fixtures.....	5 00	
1 iron tar bucket.....	75	
1 toilet sink.....	3 00	
1 soap dish.....	15	
1 coal scuttle.....	1 00	
1 shovel.....	50	
1 " holder.....	50	
1 sprinkler.....	1 25	
1 iron ash-pail.....	50	
5 lanterns.....	5 00	
ink.....	75	
blank books.....	4 40	
		139 35
CROPS.		
<i>Potatoes.</i>		
2 acres peachblows.....	\$125 00	
15 bushels Brownell's beauty.....	15 00	
11 " Compton's surprise.....	11 00	
5 " Snow Flake.....	5 00	
10 " Extra Early Vermont.....	10 00	
9 " Early Rose.....	9 00	
		175 00
<i>Wheat.</i>		
270 bushels threshed wheat.....	\$270 00	
240 " unthreshed wheat (estimated).....	240 00	
33 acres winter wheat.....	330 00	
		840 00
<i>Oats.</i>		
60 bushels white Shunan seed, @ 30c.....	\$18 00	
60 " Excelsior seed, @ 30c.....	18 00	
640 " unthreshed oats (estimated), @ 30c.....	192 00	
		228 00
<i>Hay and Straw.</i>		
100½ tons hay, @ \$8.00.....	\$804 00	
24 tons wheat straw, @ \$3.00.....	72 00	
25 " oat " @ \$4.00.....	100 00	
85 " corn stalks, @ \$1.50.....	127 50	
		1,103 50
<i>Corn, Turnips, and Grass Seed.</i>		
1,400 bushels corn (estimated), @ 20c.....	\$280 00	
17 acres turnips, @ \$30.00.....	510 00	
5 bushels blue grass seed, @ \$1.75.....	8 75	
5 " redtop " @ \$1.50.....	7 50	
4 lbs. white clover " @ 40c.....	1 60	
		807 85
<i>Wood, Coal, etc.</i>		
193 cords 4-foot wood, @ \$2.20.....	\$424 60	
70 " 18-inch wood, @ \$1.20.....	84 00	
½ ton coal.....	5 00	
40 lbs. corn meal.....	60	
200 lbs. middlings.....	2 50	
100 lbs. ground feed.....	1 50	
1,000 cubic yards compost, @ 24c.....	240 00	
500 loads manure, @ 50c.....	250 00	
Amount carried forward.....		\$6,350 46

Amount of F. D. Inventory brought forward.....		\$6,350 46
1½ gal. fish oil.....	\$0 63	
1 pt. turpentine.....	10	
2 lbs. sulphur.....	25	
100 hay covers.....	20 00	
800 split rails.....	20 00	
275 fence posts, @ 17c.....	46 75	

1,095 93

Team Horses.

Charley.....	\$150 00
Frank.....	150 00
Bill.....	75 00
Mag.....	50 00
Kit.....	125 00
Jennie.....	175 00
Fan.....	175 00

900 00

STOCK.

Short Horns.

bull Rufus.....	\$1,250 00
“ calf Hummer.....	100 00
“ “ Sir Roderick.....	150 00
cow Miss Crippin.....	250 00
“ Comely.....	300 00
“ Coronis.....	200 00
“ Chumly.....	300 00
calf “ 2d.....	100 00
cow Elaine.....	125 00
“ Evadne.....	250 00
“ Enid.....	250 00
heifer Evadne 2d.....	100 00
“ Etty.....	200 00
cow Hebe.....	300 00
“ Hero.....	250 00
calf Heroine.....	100 00
cow Hermia.....	250 00
“ Hela.....	300 00
calf “ 2d.....	100 00
heifer Henrietta.....	200 00
steer Hocus.....	75 00
“ Hodge.....	75 00

5,225 00

Devons.

bull Jennies Prince.....	\$150 00
“ calf Bummer.....	50 00
cow Evelena.....	125 00
calf Emma.....	75 00
heifer Ernestine.....	125 00
cow Helene 25th.....	75 00
“ Hilvra.....	175 00
steer Clinker.....	75 00
“ Clifford.....	75 00

925 00

Ayrshires.

bull Dundee.....	\$150 00
“ Booth.....	150 00
“ calf Leo.....	75 00
“ “ Stewart.....	75 00
cow Lucky.....	200 00
“ Blenkbunny.....	300 00
calf Blink 2d.....	100 00
cow Mary Stewart.....	150 00
“ Phelly.....	100 00

Amount carried forward..... \$14,496 29

Amount of F. D. Inventory brought forward.....		\$14,496 39
calf.....	\$75 00	
heifer Susy Stewart.....	125 00	
" Phyllis.....	125 00	
" Bride.....	150 00	
" Phylacy.....	100 00	
		1,875 00
<i>Galloways.</i>		
bull Johnny Scott.....	\$150 00	
" calf Sambo.....	60 00	
" " Boson.....	40 00	
cow Snowball.....	150 00	
heifer Snowflake.....	100 00	
		500 00
<i>Jerseys.</i>		
bull Saginaw.....	\$200 00	
cow Irene 2d.....	150 00	
calf " 3d.....	100 00	
		450 00
<i>Herefords.</i>		
heifer Cora, 3d.....	\$100 00	
		100 00
<i>Grades.</i>		
cow Fanny, 2d.....	\$70 00	
" " 4th.....	70 00	
heifer " 8th.....	50 00	
" " 10th.....	40 00	
calf " 11th.....	25 00	
cow Beauty.....	100 00	
calf " 2d.....	25 00	
1 ox fattening.....	75 00	
		455 00
SHEEP.		
<i>Merinos.</i>		
ram Moltke.....	\$10 00	
" Rich.....	15 00	
" No. 86.....	10 00	
13 pure breeding ewes, @ \$5.00.....	65 00	
1 " lamb ewe.....	5 00	
30 grade breeding ewes, @ \$3.00.....	90 00	
2 " lambs, ewes, @ \$3.00.....	6 00	
2 wethers, @ \$3.00.....	6 00	
3 " lambs, @ \$3.00.....	9 00	
		216 00
<i>South Downs.</i>		
ram Guelph, old.....	\$10 00	
" " 2d.....	25 00	
15 pure breeding ewes, @ \$6.00.....	90 00	
7 " lambs, " @ \$5.00.....	35 00	
8 grade breeding " @ \$5.00.....	40 00	
2 grade lambs, " @ \$5.00.....	10 00	
6 wethers, @ \$4.00.....	24 00	
3 " lambs, @ \$3.00.....	9 00	
		243 00
<i>Highland Sheep.</i>		
ram Rocky.....	\$15 00	
1 breeding ewe, old.....	5 00	
1 " " young.....	10 00	
		30 00
<i>Cotswolds.</i>		
ram Jim.....	\$20 00	
17 grade breeding ewes, @ \$10.00.....	170 00	
5 " lambs, ewes, @ \$5.00.....	25 00	
4 wethers, @ \$10.00.....	40 00	
		255 00
Amount carried forward.....		\$18,620 39

COLLEGE ACCOUNTS.

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Amount of F. D. Inventory brought forward.....		\$18,620 39
SWINE.		
<i>Berkshire.</i>		
1 boar.....	\$40 00	
4 breeding sows.....	100 00	
1 sow pig.....	15 00	
1 barrow.....	20 00	
		175 00
<i>Suffolk.</i>		
1 boar.....	\$30 00	
1 breeding sow.....	25 00	
2 fattening sows.....	30 00	
3 pigs.....	30 00	
		115 00
<i>Essex.</i>		
1 boar.....	\$30 00	
6 breeding sows.....	150 00	
3 fattening hogs.....	37 50	
		217 50
<i>Poland China.</i>		
1 boar.....	\$30 00	
1 breeding.....	25 00	
3 pigs.....	30 00	
		85 00
<i>Common.</i>		
2 pigs.....	\$20 00	
		20 00
		<u>\$19,232 89</u>
SUMMARY.		
Machines, tools, hardware, furniture, etc.....	\$3,196 11	
Crops.....	3,154 35	
Wood, coal, manure, ground feed, etc.....	1,095 93	
Teams.....	900 00	
Stock.....	10,886 50	
Total.....	<u>\$19,232 89</u>	

INVENTORY OF THE HORTICULTURAL DEPARTMENT.

Lawn and Garden Implements.

	Cost.	Value.
21 hoes.....		\$15 00
1 hoe, triangular.....	gift.	75
2 hoes, champion.....	"	1 50
1 hoe, long handle.....	\$0 75	50
7 hoes, Scuffle.....		3 00
2 " " improved.....		2 00
5 potato hooks.....		4 00
2 garden rakes, 12-teeth.....		2 00
10 " " 14 ".....		12 00
1 " rake, 16 ".....		75
10 " rakes, yarrow.....		5 00
3 lawn ".....	3 75	4 50
5 wooden ".....	1 75	1 40
1 " shovel, home-made.....		50
4 shovels, poor.....	4 50	3 00
1 shovel, long handle.....	1 25	1 00
1 " scoop.....	1 63	1 25
17 shovels, common.....	25 50	20 00
24 spades, ".....	36 00	30 00
3 spades, ditching.....		3 00
3 hay forks.....	3 00	3 00

	Cost.	Value.	
11 dung forks.....	\$22 00	\$20 00	
2 " " long.....		2 25	
8 digging forks.....		10 00	
11 bushel baskets.....	5 50	4 50	
10 ½-bushel baskets.....	3 75	3 00	
1 splint basket.....	20	10	
1 willow ".....	30	15	
7 scythes and snaths.....		8 50	
3 common sickles.....		1 00	
3 corn sickles.....		1 00	
<i>Heavy Garden Tools.</i>			\$164 65
roller.....		\$10 00	
" small.....		2 00	
2 single cultivators.....		8 00	
1 shovel plow.....		5 00	
1 single ".....		7 00	
2 sward plows.....		10 00	
1 subsoil plow.....		5 00	
1 Curtiss ".....	17 00	12 00	
1 harrow.....		10 00	
1 stone boat, home made.....		3 00	
1 wheel hay rake.....	32 00	25 00	
1 scraper.....	11 00	8 00	
1 planer, home made.....		2 00	
4 Irish wheel-borrows.....	7 00	8 00	
3 garden " ".....	24 00	15 00	
2 sets dump boards.....		2 00	
1 grind stone.....	5 00	1 50	
1 Champion mower.....	50 00	80 00	
1 Buckeye " old.....		5 00	
1 lawn mower.....	25 00	18 00	
1 " " old.....	25 00	3 00	
1 lumber wagon.....		30 00	
1 cart.....	45 00	35 00	
1 cart, old.....		5 00	
1 pair bobs.....		40 00	
<i>Mason Tools.</i>			349 50
1 stone hammer.....		\$4 00	
3 trowels.....		3 00	
1 chalk line.....		25	
3 hods.....		1 00	
2 sand screens.....		4 00	
<i>Pruning Tools.</i>			12 25
3 tree scrapers.....		\$1 50	
2 fruit ladders, home made.....		2 00	
1 step ".....	3 00	2 00	
1 pole pruning shears.....		1 50	
2 pruning chisels and saws.....		3 00	
2 " knives.....		1 00	
2 " hatchets.....		50	
1 long shears.....		5 00	
1 grafting chisels.....	1 00	1 00	
1 long hooked knife.....		50	
6 pruning shears, small.....		4 50	
<i>Carpenters' Tools.</i>			22 50
2 jack planes.....		\$2 50	
2 jointer planes.....		2 50	
1 smoothing plane.....		75	
1 pair matching planes.....		1 00	
2 moulding planes.....		1 50	
6 saws.....		6 50	
Amount carried forward.....			\$548 90

Amount of H. D. Inventory brought forward.....		Cost.	Value.	
1 saw-back.....			\$1 50	\$548 90 ¹
2 key-hole saws.....			75	
1 draw-shave.....			1 00	
1 spoke ".....			40	
1 mawl.....			75	
4 hammers.....			4 00	
5 hammer hatchets.....			3 75	
1 lath hammer.....			30	
4 mallets.....			25	
1 auger, 1 inch.....			80	
1 " 1½ ".....			1 00	
1 " 1¾ ".....			1 00	
1 " 3 ".....			50	
1 bit-stock.....			1 50	
5 gimlet bits.....			1 75	
5 auger bits.....			1 75	
1 set awls.....			75	
1 chisel, 1½ inch.....			1 00	
5 chisels, thin.....			2 50	
6 " cold.....			1 50	
2 gouges.....		\$0 70	50	
2 squares.....			3 75	
1 triangular square.....			40	
1 bevel square.....			75	
3 putty knives.....			50	
1 rat tail file, small.....		25	15	
1 " " large.....			75	
1 rasp file.....			50	
2 large files.....			25	
9 saw " old.....		1 35	25	
				49 30 ¹
<i>Office Furniture.</i>				
1 table.....			\$3 00	
1 book case.....			3 00	
3 chairs.....			1 00	
17 fruit plates.....			3 00	
1 stove.....			3 00	
charts.....			1 00	
1 bill case.....			50	
				14 50 ¹
<i>Horses, Harness, etc.</i>				
1 mare, May.....	175 00	\$50 00		
1 horse, Old Prof.....		5 00		
1 team.....	300 00	350 00		
1 double harness.....	37 00	35 00		
1 cart.....	17 00	15 00		
3 old harnesses.....		4 00		
1 pair blankets.....	4 00	2 00		
curry comb and brush.....		50		
1 lantern.....		1 25		
				462 75 ¹
<i>Miscellaneous.</i>				
1 oil stone.....		\$0 50		
1 saw-set.....		75		
2 screw-drivers.....		75		
6 axes.....		6 00		
3 monkey wrenches.....		2 00		
3 seythe ".....		15		
3 cast iron ".....		1 00		
1 level.....		1 00		
1 pair dividers.....		50		
4 wood saws.....	4 50	4 00		
Amount carried forward.....				\$1,075 45 ¹

	Cost.	Value.	
Amount of H. D. Inventory brought forward.....			\$1,075 45
2 beetle rings.....		\$0 40	
2 iron wedges.....		75	
1 gauge.....		50	
1 rimmer.....		20	
2 seed cases.....		20 00	
2 work benches.....		4 00	
paint can and dishes.....		6 00	
crow-bar.....		2 00	
2 long ladders.....	\$10 00	7 00	
pieces log chain.....		5 00	
3 pickaxes and handles.....	5 40	5 00	
brand.....		2 00	
2 tool cases, home made.....		15 00	
1 pair sheep shears.....		1 00	
1 mop.....	40	25	
4 sod cutters.....		3 00	
1 patent weeder.....		25	
8 common weeders.....		1 00	
3 pails.....		75	
1 splint broom.....	75	75	
1 rod pole, home made.....		1 00	
markers, " ".....		3 00	
stoves and old furnaces.....		5 00	
3 measures.....		50	
1 ½-bushel measure.....		40	
7 3 qt. boxes.....		50	
2 grass cutters.....	50	30	
1 Union scales.....		10 00	
16 bags, \$3.00; 4 jugs, 75c; 1 tub, 60c.....		4 25	
3 edging shears.....		4 00	
2 wheel weeders.....		1 00	
Comstock's drill.....	15 00	10 00	
Mosher's ".....	gift.	7 50	
old drill.....		2 00	
5 garden trowels.....	1 50	1 00	
6 reels.....		3 00	
1 tape line.....		1 25	
			145 95
<i>Produce.</i>			
1 barrel early Vermont potatoes.....		\$2 25	
specimens of seed potatoes, 250 varieties.....		25 00	
seedling potatoes.....		10 00	
12 bushels salsify, @ 50c.....		6 00	
600 cabbages, @ 3c.....		18 00	
200 bushels onions, @ 50c.....		100 00	
40 " parsnips, @ 25c.....		10 00	
20 " beets, @ 35c.....		7 00	
50 bunches celery, @ 4c.....		2 00	
1 bushel peppers.....		50	
20 " turnips, 10c.....		2 00	
5 " sweet potatoes, @ \$1.00.....		5 00	
200 " apples, @ 60c.....		120 00	
100 " " 25c.....		25 00	
100 " " 10c.....		10 00	
4 " carrots, @ 15c.....		60	
95 squashes, @ 4c.....		3 80	
6 bushels tomatoes, @ 30c.....		1 80	
4 loads of mulch, @ \$2.00.....		8 00	
			356 95
<i>Stable Supplies.</i>			
4½ tons hay, @ \$12.00, cut on lawn.....		\$54 00	
Amount carried forward.....			\$1,578 35

COLLEGE ACCOUNTS.

29

	Cost.	Value.	
Amount of H. D. Inventory brought forward.....			\$1,578 35
1 load oat straw.....	\$2 50	\$2 50	
80 bushels oats, @ 35c.....	28 40	28 40	
10 loads bedding, @ \$1.00.....	10 00	10 00	
1 pt. castor oil.....	40	40	
			95 35
<i>Fuel.</i>			
10 cords wood, @ 10 shillings, cut on lawn.....		\$12 50	
23 $\frac{1}{4}$ tons coal, @ \$9.50.....	225 62	225 62	
			238 12
<i>Compost.</i>			
400 yards, @ 50c., estimate of cost.....	2 00	\$200 00	
25 " " \$1.50 " " ".....	37 50	37 50	
leaf mold, 2 loads " " ".....	1 50	1 50	
			239 00
<i>Barrels and Boxes.</i>			
3 kerosene barrels.....	3 00	\$1 50	
100 new ".....	35 50	35 50	
35 old " @ 4c.....		1 40	
48 show boxes, @ 50c.....		24 00	
5 crates, @ 40c.....		2 00	
10 miscellaneous boxes, @ 10c.....		1 00	
boxes.....		2 00	
			67 40
<i>Paints and Oils.</i>			
20 lbs. white lead, @ 8c.....	1 60	\$1 60	
16 " cleve stone, @ 12c.....	1 92	1 92	
2 kegs of paint, \$2.00.....	4 00	4 00	
ochre, lamp black, unuber.....		1 00	
5 lbs. paris green.....		2 50	
benzole.....		15	
5 gal. boiled oil, @ 70c.....	3 50	3 50	
11 $\frac{1}{2}$ gal. raw oil, @ 80c.....	1 20	1 20	
2 $\frac{1}{4}$ barrel crude oil, @ 15c.....	9 00	9 00	
			24 87
<i>Miscellaneous.</i>			
nursery stock.....		\$150 00	
seeds.....		5 00	
1 barrel plaster.....		1 00	
1 " lime.....		75	
1 $\frac{1}{2}$ " ".....		50	
glass boxes, 10x14.....		95 00	
lumber and labels.....		25 00	
nails, tacks, etc.....		5 00	
6 hitching posts.....		3 00	
1 spool fencing wire.....		5 00	
1 lb. sulphur.....		16	
4 oil cans.....		2 00	
8 tool handles.....		75	
50 lath screens.....		10 00	
bills receivable.....		198 82	
			501 98
<i>Greenhouse Appurtenances.</i>			
1 ladder.....		\$3 50	
22 hot-bed sash, some old.....		55 00	
8 thermometers.....		4 00	
16 hot-bed shutters, @ \$3.50.....	56 00	46 00	
4 watering pots.....		5 00	
1 syringe.....		5 00	
315 flour pots.....		30 00	
15 hanging baskets.....		15 00	
120 feet garden hose.....		40 00	
Amount carried forward.....			\$2,745 07

Amount of H. D. Inventory brought forward.....		\$2,745 07
12 pot plant trellises.....	\$2 25	
3 barrels of tobacco.....	1 50	
flower seeds.....	11 00	
2 boxes glass.....	10 00	
2 chairs.....	1 00	
2 ".....	4 00	
1 ".....	4 00	
1 carpet.....	10 00	
1 bedstead.....	5 00	
1 table.....	2 00	
1 stove and pipe.....	10 00	
4 curtains.....	8 00	

272 25

Greenhouse Plants.

4 Abutilon Mesopotamicum.....	\$2 00
4 " Boule de Niede.....	2 00
9 " Thompsonii.....	9 00
2 " Compte de Aras.....	1 25
3 " Striatum.....	1 00
4 " Duc de Malakhoff.....	5 00
10 " Santana Alba.....	11 00
6 " Venosum.....	2 00
2 Acacia Salacina.....	1 00
2 " Melanoxylon.....	1 00
3 " Armata.....	1 50
2 " Arabica.....	1 00
1 " Macradenia.....	50
2 " Decurrens.....	1 00
3 " Lophantha.....	8 00
12 " Undulæfolia.....	9 00
6 " Chordophylla.....	3 00
1 " Sophorae.....	2 50
12 " Striata.....	7 00
6 Agapanthus Umbellatus.....	12 00
8 Alonsoa Incisifolia.....	8 00
2 Aspidistra Lurida Variegata.....	2 00
1 Anthurium Scherzerianum.....	5 00
6 Artanthe Elongata.....	2 00
1 Alsophila Australis.....	30 00
1 Aerides Odoratum Majus.....	9 00
3 Ardisia Crenulata.....	1 50
1 Aralia Sieboldi.....	7 00
3 " Papyrifera.....	1 00
6 Artemesia argentea.....	3 00
3 Albuca Exuviensis.....	3 50
50 Alternanthera Magnifica.....	3 00
25 " Versicolor.....	3 50
1 Arthyrium Goringianum Pictum.....	1 00
1 Aretocarpus Ghiesbreghtii.....	1 00
2 Aucuba Japonica.....	2 00
18 Achyranthus Gilsonii.....	2 50
23 " Verschaffeltii.....	2 00
40 " Lindenii.....	4 00
18 Adiantum cuneatum.....	13 00
4 " Macrophyllum.....	3 00
12 " Affine.....	1 50
6 Asplenium Myriophyllum.....	3 50
12 " Bulbiferum.....	13 00
2 " Viviparum.....	1 50
5 Achinia Malvaviscus.....	9 00
3 Aloe Acinicipolia.....	2 00
1 " Margaritifera.....	3 00
1 " Soccotrina.....	5 00

Amount carried forward..... \$3,017 33

Amount of H. D. Inventory brought forward.....		\$3,017 32
2	" <i>Dicpotoma</i>	\$1 00
3	" <i>Obliqua</i>	2 00
2	" <i>Retusa</i>	4 00
1	" <i>Variegata</i>	2 00
2	" <i>Elegans</i>	3 00
1	" <i>Ferox</i>	7 00
12	<i>Aloysia citrodora</i>	1 00
2	<i>Arthropodium cirratum</i>	3 50
2	<i>Agave Wembiesens</i>	50
2	" <i>Bourcheana</i>	50
7	" <i>Americana</i>	65 00
2	" " <i>Fol bar</i>	8 00
2	" " <i>Medio Pietis</i>	5 00
12	<i>Amaryllis Jackmanii</i>	8 00
6	" <i>Othello</i>	1 00
24	<i>Ageratum Mexicanum</i>	2 50
1	<i>Azalea Souvenir de la Exposition</i>	2 00
1	" <i>Duc de Nassau</i>	3 50
3	" <i>Louise Margottin</i>	4 00
3	" <i>Queen of roses</i>	3 00
4	" <i>Model</i>	2 50
2	" <i>Imperialis</i>	5 00
1	<i>Aechmia Fulgens</i>	1 50
1	<i>Aphelandra Aurantiacum Roezlii</i>	50
2	<i>Anona Reticulata</i>	1 50
2	" <i>Muricata</i>	2 50
1	<i>Aspidium Molle</i>	50
6	<i>Begonia Glaucophylla Scandens</i>	4 50
8	" <i>Fuchsoides</i>	4 00
24	" <i>Saundersoni</i>	12 00
5	" <i>Nitida alba</i>	2 50
13	" <i>Fuchsoides alba</i>	6 50
17	" <i>Insignis</i>	8 50
2	" <i>Cinnabarina</i>	50
6	" <i>Multiflora</i>	3 00
2	" <i>Hydrocoryllifolia</i>	1 00
6	" <i>Weltoniensis</i>	1 50
12	" <i>Sulpeltata Nigricans</i>	9 00
6	" <i>Manicata</i>	3 00
24	" <i>Robusta</i>	23 00
2	" <i>Pearceii</i>	1 00
5	" <i>Ascotiance</i>	3 75
12	" <i>Sanguinea</i>	4 00
24	" <i>Baron Rothschild</i>	10 00
25	" <i>Leopoldii</i>	5 00
30	" <i>Rex</i>	6 00
15	" <i>Argentea</i>	4 75
6	" <i>Metallica</i>	3 00
10	" <i>Crassicaulis</i>	4 00
10	" <i>Incarната</i>	4 50
1	<i>Brachchiton Populneum</i>	2 00
1	<i>Billbergia Thyrsoides</i>	1 50
1	" <i>Bicolor</i>	1 00
1	<i>Banisteria Ferruginea</i>	3 00
1	<i>Bouvardia Jasminoides</i>	50
75	" <i>Davidsoni</i>	37 50
39	" <i>Elegans</i>	19 50
25	" <i>Leiantha</i>	12 50
1	<i>Beaucarna Glauca</i>	2 00
1	<i>Brugamansia Suaveolens</i>	1 50
4	<i>basela Tuberosa</i>	50
2	<i>Bromelia Ananas</i>	1 50
39	<i>Balsam</i>	3 90

Amount carried forward..... \$3,017 32

Amount of H. D. Inventory brought forward.....		\$3,017 32
1	Berrya Ammonilla.....	\$1 00
2	Blechnum Braziliensis.....	2 00
6	Cordylone Indivisa Vivipare.....	1 50
1	“ Australis.....	2 50
2	“ Indivisa.....	10 00
12	“ “ Azurea.....	5 00
7	Codiaeum Rubra variegata.....	9 00
2	Croton Mobicanum interruptum.....	2 00
2	“ Geminum angustifolia.....	2 00
2	“ Variegata.....	2 00
1	“ Pictum.....	1 00
1	“ Irregulare.....	1 50
3	Cissus Argentia.....	2 00
3	“ Discolor.....	2 00
1	“ Lindenii.....	50
1	“ Alba.....	1 00
1	“ Cupressus Funebris.....	1 00
1	Cycas Revoluta.....	5 00
1	Cibotium Regale.....	20 00
25	Cytisus Racemosa.....	5 25
2	Coffea Arabica.....	5 00
3	Correa Ferruginea.....	1 50
2	Chinchona alba.....	2 50
1	Cypripedium Grandiflora.....	3 00
4	“ Insigne.....	2 00
2	Colocasia Odorata.....	10 00
1	Caryota urens.....	5 00
40	Crassula Coccinea.....	4 00
30	“ Odoratissima.....	4 50
2	“ Bractata.....	2 00
6	“ Perfoliata.....	3 00
19	Cuptua Platycentra.....	2 85
1	Columnnea Schudiana.....	1 00
1	Cestrum Parqui.....	75
12	Chorozema Varie.....	3 25
2	Comadaris Elegans.....	3 50
10	Carnation Souvenir de la Malmaison.....	3 20
50	“ Edwardsii.....	16 00
100	“ Pres de Graw.....	32 00
100	“ La Purite.....	32 00
25	“ Louise La Noir.....	8 00
25	“ Seedlings.....	8 80
5	Centradenia Grandiflora.....	4 00
4	“ Rosea.....	1 00
2	“ Florabunda.....	1 00
3	Callistemon Rugulosus.....	2 00
24	Centaurea Gymnocarpa.....	6 00
60	“ Candida.....	9 30
150	Calceolaria Hybrida.....	15 00
220	Ceneraria Hybrida.....	90 00
1	Campylobotrys Discolor.....	1 00
1	Cakeolaris Sp.....	1 00
3	Cyclamen Persicum.....	2 25
2	“ Hederafolium.....	1 50
2	“ Neapolitanum.....	75
25	Coleus Verschaffettii.....	3 00
12	“ The Shah.....	3 00
18	“ Negro.....	2 00
20	“ Marmorata.....	2 00
10	“ Golden Beauty.....	1 00
25	“ Chameleon.....	2 00
6	“ Stella.....	1 00
4	“ Beauty of St. John's Wood.....	1 00

Amount carried forward..... \$3,017 32

Amount of H. D. Inventory brought forward.....		\$3,017 32
3 Coleus South Park Gem.....	\$1 00	
4 Curculigo Recurvata.....	7 00	
1 Clivea Nobilis.....	4 00	
1 Crinum Amabile.....	2 00	
4 Citrus Limonum.....	7 00	
3 " Aurantiacum.....	6 00	
4 Clerodendron Balfourii.....	5 00	
2 " Fallax.....	1 00	
4 " Fragrans.....	1 50	
1 Cassia Senna Occidentalis.....	5 00	
3 Corymbiflora Candidissima.....	5 00	
1 Corynephrus canescens.....	30	
1 Chamairops Adansonii.....	6 00	
3 Canna Warezewiczii.....	1 00	
1 " Tricolor.....	1 00	
5 " Rubra Lineata.....	1 50	
4 " Reevesii.....	1 50	
2 Cereus Grandiflorus.....	12 00	
2 " Serpentinus.....	7 00	
1 " Lateritius.....	1 00	
1 Caladium Belleymeli.....	1 00	
20 " Esculentum.....	12 00	
2 " Purpurea.....	4 00	
4 Cactus Multangularis.....	2 00	
1 " Polyanthus.....	5 00	
4 " Triquitor.....	6 00	
2 " Phyllanthoides.....	1 00	
1 " Heptagonis.....	5 00	
2 " Tuna.....	6 00	
1 " Stellaris.....	5 00	
1 Camellia candidissima.....	1 00	
1 " Imbricata.....	2 00	
3 " Incarnata.....	4 00	
3 " Alba Plena.....	10 00	
5 Coronilla Glauea.....	4 00	
4 Chrysanthemum Variegata.....	1 50	
10 " Countess Granville.....	2 50	
3 " Golden crest.....	1 50	
2 " Mrs. Keynes.....	1 00	
2 Ceratonia Siliqua.....	12 00	
2 Cobeia variegata.....	2 50	
1 Cookia Punctata.....	6 00	
7 Cocoloba Platyclada.....	5 00	
1 Callistemon Lanceolatus.....	5 00	
1 " Florida.....	1 00	
1 Cotyledon Corruscans.....	1 00	
5 Dracena Congesta.....	40 00	
1 " Guilfoili.....	4 00	
9 " Terminalis.....	4 75	
1 " Speciosa.....	4 00	
3 " Cooperii.....	1 50	
1 " Ferrea.....	1 50	
1 " Negro Rubra.....	50	
2 " Ensifolia.....	5 00	
1 " Braziliensis.....	9 00	
3 Doodia Candata.....	1 00	
1 Dicksonia Antaretica.....	10 00	
2 Dactylis Glomerata bar.....	50	
3 Duffenbachia Macrophilla.....	5 00	
1 Dianella caerulea.....	3 00	
2 " Longifolia.....	5 00	
1 Delachamphia Boezliana Rosea.....	1 00	
6 Dentzia Gracilis.....	1 50	
Amount carried forward.....		\$3,017 32

Amount of H. D. Inventory brought forward.....		\$3,017 32
1	Dionaia Muscipula.....	\$0 50
100	Dahlias in variety.....	40 00
2	Davallia dissecta.....	1 00
5	Daphne Indica Odorata.....	3 50
6	Diplopappus Filifolius.....	4 50
12	Duranta Baumgarti var.....	1 00
3	Eugenia Ligustrina.....	30 00
1	" Unifolia.....	1 00
1	Echites Picta.....	50
1	Eranthemum Andersonii.....	75
3	Eucalyptus Globulus.....	2 00
4	" Obliqua.....	1 00
6	" Eugenoides.....	3 00
2	" Sp.....	1 00
3	Eucharis Amazonica.....	5 00
14	Euphorbia Jacquiniiflora.....	6 00
1	" Canariensis.....	2 00
1	" Splendens.....	3 50
1	Ertricteria variegata.....	1 00
16	Euonymus Japonica.....	8 00
1	Electium Ecelsior.....	10 00
2	Erythrina crista galli.....	3 00
1	Excoecaria Sebifera.....	1 50
4	Echeveria Atro Purpurica.....	1 00
1	" Glauca.....	1 50
15	Eupatorium Arboreum.....	7 50
14	" Conspicuum.....	5 00
19	" Elegans.....	9 00
1	Epiphyllum Truncatum.....	75
3	" Crenatum.....	1 50
1	Echinocactus Texensis.....	2 00
1	Farfugium Grande.....	1 50
1	" Sigulatum var.....	1 00
4	Ficus Elastica.....	10 00
1	" Repens.....	50
6	" Lucida.....	7 00
1	Fabiana Imbricata.....	75
4	Fittonia Argyroneura.....	2 25
3	" Gigantia.....	3 00
3	" Verschaffeltii.....	3 00
20	Fuchsia Carl Hatt.....	4 60
21	" Beauty of Clapham.....	4 83
15	" Pearl of England.....	3 45
22	" Mrs. Bromly.....	5 06
15	" Conqueror.....	3 45
17	" War Eagle.....	3 91
6	" Albo coccinea.....	1 38
25	" Sunset.....	5 75
20	" Avalanche.....	4 60
50	" Elm City.....	11 50
25	" Puritani.....	5 75
30	" Warrior.....	6 90
12	" Conspicua.....	2 76
16	" Hercules.....	3 68
6	" Diadem.....	1 38
12	" William Turner.....	2 76
25	" Wave of Life.....	5 75
8	" Punch.....	1 84
25	" Veritas.....	5 75
12	" Black Prince.....	2 76
26	" Adaline.....	5 98
7	" Excellent.....	1 61
10	" Venus de Medici.....	2 30

Amount carried forward..... \$3,017 32

COLLEGE ACCOUNTS.

Amount of H. D. Inventory brought forward.....		\$3,017 32
2	Fuchsia Madam Cornelson.....	\$0 46
36	" Aucubafolia.....	8 28
25	" Speciosa.....	5 75
30	" Sir Colin Campbell.....	6 90
22	" Bianca Marginata.....	5 86
1	Gynnogamma Laucheana Magnifica.....	3 50
2	Guava Sp.....	1 00
1	Gmelia Rheedii.....	1 00
4	Gossypium Religiosa.....	3 00
2	Goldfusia Isophylla.....	5 00
6	Galanthus Plicatus.....	1 50
100	Gloxinia Hybrida.....	10 00
5	Gesneria Jebrina.....	2 50
50	Guaphalium Lanatum.....	10 00
12	" Saundersoni.....	3 00
6	" Tomintosa.....	50
100	Gesneria Sp.....	10 00
30	Genista Fragrans.....	6 00
3 doz.	Gladiolus Brenchleyensis.....	6 00
1 doz.	" French Hybrid.....	1 00
Geraniums, Ivy Leaved.....		
24	L'Elegant.....	2 40
1	Innocence.....	10
3	Fairy Bell.....	30
2	Princess Alexandra.....	20
Geraniums—Jonale Varieties—		
50	Beaton's Perfection.....	20 00
35	Lord Palmerston.....	12 00
40	Beaton's Rival.....	10 00
15	Indian yellow.....	4 00
20	Wonder.....	6 00
7	Ossian.....	3 00
9	General Grant.....	5 00
22	Donald Beaton.....	9 00
35	Christina.....	10 00
15	Rival.....	7 00
12	Amelia Grissan.....	5 00
7	Bridesmaid.....	4 00
12	Emily Vancher.....	6 00
10	Bond's Superb.....	7 00
25	Duchesse.....	9 00
100	Seedlings.....	8 00
Geraniums—Hybrid and Scented—		
75	Capitatum.....	4 50
20	" Major.....	1 20
5	Lady Plymouth.....	30
10	Tomentosum.....	60
10	Quercifolium.....	1 00
4	Shrubland Pet.....	40
Geraniums—Double—		
22	Asa Gray.....	10 00
12	Andrew Henderson.....	4 00
15	Emily Lemoine.....	8 00
10	Aline Tisly.....	4 50
4	Gloire de Nancy.....	1 50
Geraniums—Golden Tricolor—		
25	Sunset.....	5 00
10	Lady Cullum.....	2 00
5	Mrs. Pollock.....	1 25
2	Italia unita.....	50
Geraniums—Silver Edged and Tricolor—		
15	Mountain of Snow.....	2 25
10	Flower of Day.....	1 50
Amount carried forward.....		\$3,017 32

Amount of H. D. Inventory brought forward.....		\$3,017 32
5 Flower of Spring.....	\$0 75	
5 Bijou.....	75	
10 Beauty of Caulderdale.....	1 50	
Geraniums—Bronze and Golden.		
12 Cloth of Gold.....	3 60	
8 Golden circle.....	2 40	
10 Golden Fleece.....	3 00	
10 Golden Vase.....	3 00	
2 Hydrangea Paniculata Grandiflora.....	1 50	
2 Hoya Bella.....	1 25	
6 " Carnosa.....	20 00	
1 " " Variegata.....	1 00	
1 " Paxtonii.....	1 00	
2 Hibiscus Cooperii.....	2 00	
6 Hebeclinum Fanthinum.....	5 00	
13 Hedera Helix.....	3 00	
1 " Canariensis.....	50	
1 " Argentea Arboria.....	1 50	
20 Heliotropium Little Nigress.....	12 50	
18 " Garibaldi.....	12 00	
8 " Standard.....	5 00	
Hyacinths.....	5 00	
30 Habrothamnus Elegans.....	15 00	
4 " Scabra.....	5 00	
4 Hemionitis Palmata.....	1 00	
5 Imantophyllum Miniatum.....	7 50	
1 Ilex Vomitoria.....	1 00	
1 Ichnocarpus Frutescens.....	50	
1 Isolepis Gracilis.....	25	
6 Jasminum Sambac.....	3 00	
4 " Grandiflorum.....	5 00	
3 " Nudifolium.....	1 00	
8 Justicia Carneae.....	3 50	
4 " Speciosa.....	3 00	
4 Jambosa Vulgaris.....	15 00	
30 Koeniga Maritimum.....	3 00	
20 " " Variegata.....	3 30	
4 Lonicera Brachypoda.....	1 00	
12 " Reticulata aurea.....	1 50	
6 Lantana Grand Sultan.....	50	
7 " Delicatissima.....	1 00	
4 " Aurantica.....	50	
5 Libonca Florabunda.....	4 00	
21 Linaria cymbalaria.....	2 00	
1 Lomaria Gibba.....	10 00	
24 Lobelia Erinus.....	2 00	
25 " Paxtoni.....	3 00	
24 " Cinderella.....	2 00	
1 Lastria Patenes.....	25	
3 Lygodium Palmata.....	1 00	
2 Lysimachia Numularia.....	50	
1 Latania Borbonica.....	25 00	
2 Lopezia Rosea.....	1 00	
2 Maranta Amabilis.....	50	
1 " Regalis.....	1 50	
2 " Portiana.....	1 00	
6 " Bicolor.....	4 00	
12 Maurandia Barclayana.....	1 50	
1 Mimosa Pudica.....	15	
2 " Sp. from Andes of Peru.....	25	
6 Mimulus Moschatus.....	1 00	
3 Musa Cavendishii.....	25 00	
12 Mandevilla Suaveolens.....	4 00	

Amount carried forward..... \$3,017 32

Amount of H. D. Inventory brought forward.....		\$3,017 32
12 Mesembryanthemum cordifolium var.....	\$2 25	
12 Mikania scandens.....	1 00	
25 Myrsiphyllum asparagoides.....	13 00	
4 Myrtus Communis.....	10 00	
2 " Tarantina.....	1 50	
6 Menesicium Simplex.....	2 50	
3 Mahernia Odorata.....	2 00	
1 Monstera Deliciosa.....	2 00	
1 Medinilla Magnifica.....	1 50	
9 Melalencia Diosmafolia.....	9 00	
4 " Ericaefolia.....	3 00	
2 Metrosideros Salicifolia.....	2 00	
1 " Augustifolia.....	50	
1 " Florida.....	1 00	
1 Mamillaria atrata.....	50	
20 Mignonette.....	5 00	
7 Mackaya Bella.....	9 00	
12 Meyenia Erecta.....	6 00	
2 Magnolia Grandiflora.....	2 00	
12 Neirembergia Grandiflora.....	2 00	
1 Nerium Alba.....	3 00	
3 " Carneum.....	5 00	
15 Nephrodium Molle.....	2 50	
1 " " Corymbiferum.....	50	
1 Nepenthes Phyllamphora.....	6 00	
2 " Gracilis Major.....	4 00	
5 Nephrolepsis Exaltata.....	3 75	
15 Oxalis Grandiflora.....	2 00	
6 " Rosea.....	1 00	
2 " Versicolor.....	50	
1 Oncidium cavendishii.....	7 00	
6 Ohloranthus officianalis.....	5 00	
5 Othorma crassifolia.....	1 00	
6 Pelargonium Crimson King.....	1 50	
6 " Lulu.....	1 50	
15 " Agnes.....	3 75	
20 " Madam Prescatore.....	5 00	
5 " Louis Odier.....	5 00	
10 " Compte de Paris.....	2 50	
1 " Gibbosum.....	25	
22 " Seedlings.....	5 50	
25 Polyanthus Tuberosa.....	1 00	
1 Phormium Tenax.....	50	
90 Primula Sinensis.....	45 00	
50 " Alba plena.....	50 00	
8 " Kermesina.....	4 00	
1 " Filicifolia.....	50	
12 " Auricula.....	6 00	
24 Pyrethrum Alba Florabunda.....	6 00	
24 " Parthenifolia aurea.....	4 00	
18 Poinsettia Pulcherrima.....	20 00	
1 Pothos argyrea.....	50	
1 " Macrophylla.....	1 00	
1 Plumbago Capensis.....	25	
1 " Zeylanica.....	1 50	
1 Polygoneum Brunonis.....	50	
1 Pipir Trifolium.....	1 00	
2 " Glabrum.....	50	
15 Pilea Arborea.....	4 00	
1 Physianthus Albens.....	2 00	
1 Philodendron Laceron.....	75	
6 Peperomia Maculosa.....	3 00	
1 " Procumbens.....	50	

Amount carried forward..... \$3,017 32

Amount of H. D. Inventory brought forward.....		\$3,017 32
1 Peperomia Velutina.....	\$0 50	
6 Passiflora Trifasciata.....	2 50	
1 " Caerulea.....	50	
2 " Quadrangularis.....	2 00	
12 Panicum Plicatum variegata.....	50	
4 " Vittata Argentea.....	50	
6 Pandanus Javanicus Argentius.....	11 00	
13 " Utilis.....	24 00	
500 Pansies.....	10 00	
50 Petunia Seedlings.....	5 00	
3 Phais Grandiflora.....	1 00	
3 Peristrophe Angustifolia variegata.....	1 00	
18 Pteris serrulata.....	4 50	
6 " " Corymbifera.....	4 00	
7 " Argyrea.....	5 00	
12 " Cretica Alba Lineata.....	6 00	
3 " Tremula.....	1 50	
1 " Hastata.....	25	
4 Phletodium Aureum.....	1 00	
18 Phœnix Dactylifera.....	13 50	
5 Platycerium Alciorne.....	10 00	
5 Pittosporum Tobira.....	10 00	
4 " " variegata.....	2 50	
4 " Crassifolia.....	3 75	
12 Polygala Brachypoda.....	3 00	
6 Pimelia Decussata.....	3 00	
1 Pranceofus Repins.....	50	
1 Pancratium Fragrans.....	50	
6 Photinia Japonica.....	3 00	
3 Russellia Juncea.....	1 00	
4 Ruellia Formosa.....	2 00	
3 Rynchospermum Jasminoides.....	1 00	
" " variegata.....	25	
Roses—Noisette and Hybrid Noisette.....		
20 Celine Forestier.....	5 00	
30 LaMarque.....	6 00	
50 Gloire de Dijon.....	10 00	
20 Marechal Niel.....	4 00	
25 America.....	5 00	
20 James Sprunt.....	4 00	
25 Washington.....	5 00	
30 Rosamond.....	6 00	
Roses—Bemontant—.....		
10 General Jacqueminot.....	3 00	
15 La Reine.....	4 50	
35 Julis Margottin.....	10 50	
25 John Hopper.....	7 50	
10 Pœonia.....	3 00	
5 Eugene Sue.....	5 00	
5 Charles Lefevre.....	1 50	
Roses—Tea—.....		
12 Adam.....	3 60	
6 Complexe de la Barthe.....	1 80	
75 Bon silene.....	22 50	
12 Cells.....	3 60	
100 Isabella Sprunt.....	30 00	
50 Bella.....	15 00	
100 Countess of Bath.....	30 00	
12 Safrano.....	3 60	
6 Souvenir d' un Ami.....	1 80	
100 President.....	30 00	
10 Duc de Cazes.....	3 00	
17 Pauline La Bonti.....	5 10	

Amount carried forward..... \$3,017 32

Amount of H. D. Inventory brought forward.....	\$3,017 32
Roses—Bourbon—	
50 Douglas.....	\$7 50
50 Hermosa.....	7 50
50 La Phoenix.....	7 50
20 Sanguinea.....	3 00
28 Rio de Cremoise.....	1 20
20 Paxton.....	3 00
50 Agrippina.....	7 50
50 Appolini.....	7 50
50 Bourbon Queen.....	7 50
15 George Peabody.....	2 25
10 Laurenceii.....	1 50
7 Leveson Gower.....	1 05
Roses—Moss and Hybrid China.	
25 Madam Plantier.....	2 50
20 Laneii.....	2 00
15 Princess Adelaide.....	1 50
12 Selina.....	1 20
15 Persian yellow.....	1 50
Roses—Hardy Climbing—	
13 Stanwell.....	1 30
136 Richardia Ethiopica.....	65 50
“ Alba Maculata.....	1 50
2 Rondelitia Speciosa and Anomale.....	2 50
12 Rubus Rosæfolius.....	3 00
1 Rochea Falcata.....	1 00
3 Ragabotria Longifolia.....	1 00
1 Rethcamphia Lentiscens.....	1 00
30 Senecio Scandens.....	1 50
1 “ variegata.....	1 25
1 Seaforthia Elegans.....	5 00
35 Saxifraga Sarmetosa.....	3 50
12 “ Elegans.....	1 20
1 Sidum Fabarum.....	1 25
6 “ Carnia Variegata.....	1 00
3 Sempervivum Californicum.....	1 00
2 “ Tectorium.....	50
1 Sollya Heterophylla.....	25
2 Solanum Jasminoides.....	4 00
1 “ “ variegata.....	50
3 Sandesia Nobilis variegata.....	12 00
4 “ “ Glaucohylla.....	4 50
1 Sansevieria Zeylanica.....	5 00
1 Sarracenia Drummondi Alba.....	3 00
1 Stephanotis Florabunda.....	1 00
6 Statice spicata.....	1 00
2 Strelitzia Augusta.....	50 00
2 Sueda Dendroides.....	1 00
50 Stocks Winter Flowering.....	2 00
12 Spartocytis Religiola.....	3 00
1 Streptocarpus Rexi.....	1 00
2 Stapelia Hirsuta.....	50
30 Salvia Officialis var.....	2 50
12 “ Splendens.....	1 50
1 “ Grandiflora.....	75
1 “ Formosa.....	75
7 Solanum Compactum.....	3 00
2 Sabal Palmetta.....	4 00
3 “ Adansonii.....	3 00
8 “ Dealbata.....	2 50
7 Stevia Serrata.....	1 00
4 Stravadium Alba.....	5 00
12 Selaginella Denticulata.....	2 00

Amount carried forward..... \$3,017 32

Amount of H. D. Inventory brought forward.....		\$3,017 82
10 Selaginella Stolonifera.....	\$2 00	
12 " Densa.....	2 50	
1 " Laevigata.....	1 50	
2 " Altissima.....	2 00	
1 " Plumosa.....	50	
1 " Paradoxa.....	1 00	
3 " Delicatissima.....	1 00	
1 " Crispa.....	20	
1 " Caisium.....	25	
3 Sarracinia Purpurea.....	50	
1 Tabernaemontana coronaria.....	50	
2 Tecoma Capensis.....	12 00	
1 Thymus Argentia Variegata.....	25	
1 Thunbergia Fragrans.....	50	
1 Torenia Asiatica.....	25	
4 Tradescantia Discolor.....	3 00	
1 " " Alba Lineata.....	15	
3 " Repens.....	50	
2 " " Vittata.....	15	
3 " Zebrina.....	20	
3 Tropæalum Lobbianum.....	1 00	
6 Tamarindus Indica.....	6 00	
2 Thea Bohea.....	50	
3 Trichomanes Radicans.....	1 00	
2 Viburnum Tinus.....	10 00	
1 Vinca Major variegata.....	25	
2 " Rosea.....	1 00	
1 " Alba.....	50	
3 Veronica Imperialis.....	2 00	
4 " Andersonii.....	1 00	
2 " Bluegens.....	2 00	
1 Vascanilla Sp.....	50	
50 Verbenas, Mrs. Woodruff.....	2 50	
75 " Sambo.....	3 75	
50 " Bride.....	2 50	
50 " Cærulea.....	2 50	
75 " Defiance.....	3 75	
50 " Advance.....	2 50	
60 " Red Rover.....	3 00	
70 " Eyebright.....	3 50	
25 " Velvet Mantle.....	1 25	
50 " Purple King.....	2 50	
14 " Punctata.....	70	
15 " Setting Sun.....	75	
16 " Seedlings.....	80	
1 Westeria Sinensis.....	1 00	
3 Woodwardia Radicans.....	1 00	
100 Wall-flowers.....	8 00	
1 Yucca angustifolia.....	12 00	
3 " Gloriosa.....	50	
3 " Rosea.....	50	
1 " Quadricolar.....	1 00	
2 " Alcefolia.....	1 00	
2 " Tricolor.....	1 00	
28 " Whippleyi.....	5 00	
3 " Purpurea.....	1 50	
1 " Raflena.....	1 00	
2 " Rateria.....	1 00	
4 Zygopetalum crinitum.....	5 00	
1 Zizyphus Mucronaria.....	2 00	
		\$3,097 45
* Total.....		\$6,114 77

* This total should be \$6,164.77. There was an omission of \$50.00 under the heading of "Green-house Appurtenances," which was not discovered until that part of the report was printed.

INVENTORY OF BOARDING HALL, SEPTEMBER 30, 1876.

Bedding, Table Linen, etc.

	Value.	Cost.
Sept. 30. 34 pillows, 12 @ \$2.00, 22 @ \$1.00.....	\$46 00	
24 pillow slips.....	3 00	\$6 00
8 " ".....	1 00	
6 sheets.....	3 00	5 62
12 " ".....	1 50	5 40
20 " ".....	2 00	
24 comforts, 12 @ \$2.50, 8 @ \$1.00, 4 @ 50c.....	40 00	
10 blankets.....	2 00	
8 colored spreads, 2 @ \$1.50, 6 @ 75c.....	7 50	
12 white spreads, 6 @ \$2.00, 6 @ 50c.....	15 00	
19 straw ticks, 16 @ \$1.75, 3 @ \$1.00.....	31 00	
7 mattresses, 4 @ \$5.00, 3 @ \$2.50.....	27 50	
1 lounge mattress.....	2 00	2 50
25 table cloths.....	25 00	66 50
24 napkins.....	3 00	6 00
20 towels.....	2 00	
18 " ".....	1 44	2 70
6 roller towels (18 yards).....	75	2 70
material on hand for comforts.....	8 00	8 00

Public Parlor Furniture, etc.

5 Prang's chromos, framed.....	62 00	60 00
3 Heliotypes, framed.....	12 50	
1 spatter works, framed.....	5 50	
1 whatnot.....	10 00	
3 curtains and fixtures.....	4 50	4 50
41 yards carpet @ \$1.05, and making, \$2.00.....	45 05	45 05
1 parlor suit.....	92 00	92 00
1 sofa.....	29 00	29 00
2 camp chairs, 1 @ \$3.75, 1 @ \$6.25.....	10 00	10 00
2 cane seat rockers.....	10 00	10 00
1 stove pipe and zinc.....	3 00	
1 lamp.....	1 00	
1 door mat.....	75	

Parlor Bedroom Furniture, etc.

2 curtains and fixtures.....	3 00	3 00
18 yards carpet @ \$1.05, and making, \$1.00.....	19 90	19 90
1 washstand.....	20 00	20 00
1 set washstand crockery.....	2 50	
1 slop pail.....	1 40	1 40
1 mirror.....	9 00	
1 bedstead and spring mattress.....	20 00	
1 table.....	3 00	
2 cane seat chairs.....	5 00	5 00

Spare Room No. 46—Furniture, etc.

18 yards carpet.....	9 00	
1 curtain and fixture.....	75	
1 Bedstead.....	9 00	9 00
1 table and spread.....	1 00	
3 chairs.....	2 25	
1 mirror.....	2 00	
1 washstand and crockery.....	7 50	
1 slop pail.....	50	

Spare Rooms No. 42 and 44—Furniture, etc.

60 yards carpet.....	18 00	
1 wardrobe.....	15 00	18 00
3 bedsteads, 1 \$9.00, 2 \$3.00.....	15 00	

STATE BOARD OF AGRICULTURE.

		Value.	Cost.
Sept. 30.	3 washstands, 2 @ \$4.00, 1 @ \$2.50.....	\$10 50	
	1 washstand crockery.....	1 25	
	6 chairs.....	2 40	
	3 curtains and fixtures.....	2 25	
	3 mirrors, 2 \$2.00, 1 \$1.00.....	5 00	
	1 table and spread.....	3 50	
	<i>Office Furniture, etc.</i>		
	1 desk.....	15 00	
	1 small bookcase.....	2 50	
	1 table.....	3 00	
	1 chair.....	2 00	
	4 chairs.....	4 00	
	23 yards carpet.....	2 30	
	2 curtains and fixtures.....	1 50	
	1 lamp.....	75	
	1 brush broom.....	15	\$0 25
	1 door mat.....	50	
	stationery, etc.....	1 50	
	<i>Employés' Rooms Furniture.</i>		
	7 bedsteads.....	19 25	21 00
	5 tables.....	2 50	
	3 bureaus.....	9 00	
	4 washstands.....	4 00	
	14 chairs.....	7 00	
	6 mirrors.....	3 00	
	8 lamps.....	2 40	
	1 clock.....	75	
	6 washbowls and pitchers.....	6 00	
	7 curtains and fixtures.....	5 25	
	1 stove and zinc.....	3 00	
	<i>Private Rooms Furniture.</i>		
	65 yards carpet.....	48 75	
	25 " ".....	3 75	
	9¾ " oil cloth.....	7 31	7 31
	1 carpet stretcher.....	1 00	1 00
	6 curtains and fixtures.....	9 00	9 00
	2 " " ".....	1 50	
	1 couch.....	5 00	
	2 tables, 1 @ \$8.00, 1 @ \$3.00.....	11 00	
	2 rockers, 1 @ \$2.00, 1 @ \$2.50.....	4 50	
	12 cane seat chairs.....	6 00	
	1 bureau.....	8 00	
	1 washstand and crockery.....	8 50	
	1 mirror.....	25	
	1 single bedstead.....	3 00	
	4 lamps.....	3 00	
	1 oil can.....	25	
	2 brooms and dustpan.....	75	
	3 door mats.....	2 25	
	1 clock.....	3 00	3 00
	1 duster.....	1 25	1 25
	1 slop pail.....	50	
	1 wash basin.....	10	
	1 rockingham.....	30	30
	2 hanging basket hooks.....	30	30
	1 stove, pipe and zinc.....	10 00	
	1 handle basket (covered).....	75	75
	<i>Wash Room Utensils.</i>		
	4 wash tubs, 3 @ 50c., 1 @ 75c.....	2 25	4 00
	6 washers.....	12 00	15 00
	6 washboards.....	1 00	1 25
	2 wringers.....	7 00	14 50

COLLEGE ACCOUNTS.

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	Value.	Cost.
Sept. 30. 1 basket.....	\$1 00	\$1 50
1 line.....	75	1 40
1/2 box clothspins.....	50	
1 wash bench.....	25	1 00
4 mops.....	40	84
1 table.....	75	
2 soap tubs.....	3 00	3 00
2 washbasins.....	40	
5 pails.....	75	1 25
1 scrub brush.....	10	50

Ironing Room Utensils.

1 stove, pipe and zinc.....	10 00	
10 flat irons, 69 lbs., @ 8c.....	4 00	5 52
3 " iron stands.....	75	
1 mangle.....	6 00	
1 skirt board.....	50	
2 bosom boards.....	30	30
2 cloths bars.....	2 00	
2 tables.....	8 00	
1 wardrobe.....	7 50	
1 basket.....	1 50	1 50
2 water pitchers and starch bowls.....	1 00	
1 ash pail and shovel.....	50	
1 handle basket.....	20	
2 brooms and dustpan.....	55	75
1 lounge.....	2 00	
2 window curtains.....	1 50	1 50
3 chairs.....	75	

Store Room.

1 safe.....	6 00	
1 coffee mill.....	2 50	
1 counter scales.....	5 00	7 00
1/2 doz. barrel covers.....	1 00	1 25
1/2 " " ".....	50	
3 cake cans.....	75	
1 whitewash brush.....	50	1 00

Furniture in Cellars.

meat refrigerator.....	60 00	75 00
2 meat blocks.....	5 00	6 00
1 " cleaver.....	2 00	2 50
1 " ".....	1 50	1 75
1 butcher knife.....	75	1 00
1 " ".....	50	1 00
1 " steel.....	1 00	1 50
2 saws.....	4 00	5 00
1 set block pulleys.....	4 00	4 00
7 lbs. rope.....	1 00	1 75
1 sausage cutter.....	1 00	
8 barrels.....	6 00	
4 baskets.....	2 00	3 00
2 molasses faucets.....	1 00	1 00
1 ice cream freezer.....	8 00	
2 pair ice tongs.....	4 00	4 00
1 1,200 lbs. scales.....	25 00	
1 meat rack.....	2 00	2 00
150 gallons stone ware.....	15 00	
1 milk safe.....	8 00	
2 cupboards.....	3 00	
5 tables.....	8 00	
8 milk pails and strainer.....	4 25	8 75
18 milk pans.....	1 80	6 00
1 butter bowl and laddle.....	50	
1 " stamper.....	50	50

	Value.	Cost.
Sept. 30. 1 vegetable cutter.....	\$0 50	
1 bread box.....	1 00	
1 " " tin.....	2 00	
1 apple parer.....	1 00	\$1 00
1 dish pan.....	1 00	
1 bread knife.....	50	75
42 half-gallon fruit cans.....	8 00	
1 butter trier.....	75	75
2 lard tubs.....	1 00	
1 handle basket.....	50	50

Furniture in Kitchen.

1 cook stove and furniture.....	5 00	
1 Van's improved bake oven.....	59 00	75 00
1 coffee roaster.....	5 00	10 00
1 coffee boiler.....	50	
1 " " copper bottom.....	2 00	4 00
1 tea boiler.....	75	
1 dipper.....	05	
2 meat boilers.....	1 00	1 94
" "	75	
1 rice boiler.....	1 00	1 69
1 hot water reservoir.....	2 00	
1 bread trough.....	1 00	4 00
2 rolling pins.....	75	
8 bread tins.....	50	
4 square cake tins.....	2 00	
10 jelly " ".....	1 00	1 00
12 cake bars.....	1 50	3 00
4 doz. pie tins.....	75	
18 pudding pans.....	90	
35 lbs. meat drippers, @ 20c.....	4 00	7 00
1 cake-pan.....	75	
4 dish-pans.....	2 00	
3 cake cutters.....	50	
1 egg beater.....	50	75
1 cake knife.....	25	40
2 graters.....	20	
1 pie shovel.....	15	
1 dustpan.....	25	
2 hanging lamps.....	1 00	
3 iron kettles.....	1 50	
1 American broiler.....	1 50	2 00
2 meat forks.....	20	40
1 chopping knife.....	50	50
3 iron spoons.....	40	
4 soup ladles.....	40	60
3 potatoe jammers.....	75	
1 lard strainer.....	40	50
1 skimmer.....	10	
2 tea caddies.....	2 00	2 50
1 tin caddy.....	75	
3 mop pails, 2 @ 15, 1 @ 20.....	50	
1 water pail.....	25	
3 chairs.....	75	
2 mops.....	20	42
1 30-gallon kettle.....	5 00	
1 mortar and pestle.....	1 00	
1 clock.....	4 00	
2 meat knives.....	50	
1 tin can, copper lined.....	1 00	
3 hand lamps.....	90	
1 cake griddle.....	1 00	
1 iron poker.....	50	
1 stove and range rake.....	50	

	Value.	Cost.
Sept. 30. 1 shovel.....	\$20	
1 funnel.....	20	
1 gallon measure.....	15	\$0 20
2 tables, 1 @ \$2.00, 1 @ \$1.00.....	3 00	
1 earthen bake dish.....	13	13
1 colander.....	10	
2 scrub brushes.....	25	33
2 knives.....	20	
8 tins and covers.....	4 00	4 00
1 chopping bowl.....	50	
1 tin can.....	50	
2 brooms.....	40	50
1½ doz. kitchen knives.....	75	75
1 can opener.....	15	25
<i>Dining Room Furniture.</i>		
3 coffee pots.....	2 00	3 50
2 tea ".....	50	
4 soup pans.....	4 00	6 00
3 " ladles.....	45	60
7 water pails.....	2 00	3 50
2 " dippers.....	20	
8 dishpans, 5 @ 75c., 3 @ 50c.....	5 25	
4 trays.....	1 50	
1 dinner bell.....	2 00	2 50
6 tables 6 legs.....	60 00	
5 " 8 legs, 3 @ \$5.00, 2 @ \$3.00.....	21 00	
1 extension table.....	5 00	
2 small and 1 large dish tables.....	2 00	
2 table brushes.....	2 00	2 50
11 curtains and fixtures.....	8 25	
8 pictures.....	41 00	
8 hanging lamps.....	6 00	
142 chairs.....	71 00	
18 ".....	13 00	13 50
4 brooms.....	80	1 00
2 dustpans.....	40	
4 mops and pails.....	1 00	
2 doz. syrup cups.....	4 00	6 00
1½ doz. sugar bowls.....	3 20	
1½ " ".....	10 00	10 00
2¼ " water pitchers.....	12 00	13 50
2½ " milk ".....	7 00	8 00
1½ " pickle dishes.....	1 40	
9 " soup plates.....	11 25	13 50
4 " ".....	3 00	
6¼ " dinner plates.....	4 75	
14 " ".....	21 00	24 50
2 " gravy boats.....	5 00	6 00
9 " cups and saucers.....	11 25	13 50
5 " ".....	3 75	
10½ " sauce plates.....	5 25	7 35
5 " ".....	2 00	
2½ " tea ".....	2 50	3 00
1½ " " ".....	90	
7 " pie ".....	2 10	
8¼ " ".....	7 00	8 25
9 large platters.....	9 00	11 25
8 " ".....	2 80	
1½ doz. medium platters.....	8 00	8 25
1½ " " ".....	3 50	
1¼ " small ".....	4 50	
1-6 " ".....	5 60	
3 vegetable dishes.....	3 00	3 00
½ doz. bowls.....	1 00	

	Value.	Cost.
Sept. 30. 1 1/4 doz. " small	\$1 00	\$1 20
3 glass sauce dishes	3 00	3 00
22 doz. glasses	15 40	15 40
2/3 " goblets	1 00	
3 " salts	3 60	
1/2 " castor bottles	1 75	1 75
6 mustard cups	1 17	1 17
1/2 doz. mustard spoons	50	50
2 " tea spoons	7 00	8 00
3 " " "	3 00	
12 1/4 " " "	18 37	
3 2/3 " table spoons	22 50	
9 " " "	31 50	
1 3/4 " " "	4 79	
3 " butter knives	12 00	
2 10-12 doz. salt spoons	5 70	
1 doz. plated forks	1 00	
2 " knives and forks	4 00	7 00
12 " knives and forks	24 00	
4 sets carvers	7 00	8 00
2 " "	3 00	3 00
7 " "	5 25	
4 " "	2 00	
9 steels, 3 @ 70c, 6 @ 67c	5 00	6 13
6 "	1 50	
20 castors	30 00	
2 "	3 00	4 00

Tools.

1 pipe vise	24 00	
1 " stock	12 00	
6 " dies	12 00	
5 " taps	10 00	
1 tap stock	2 00	
1 pipe cutter	6 00	
1 pair 3 in. pipe tongs	8 00	
1 " 1 1/4 in. " "	2 00	
2 " 1 in. " "	3 00	
1 " 3/4 in. " "	1 20	
1 " 1/2 in. " "	1 00	
1 " 3/8 in. " "	80	
1 " 1/4 in. " "	75	
1 wrench, 14 in.	1 00	
1 " 12 in.	1 00	
1 " 10 in.	75	
1 " 6 in.	50	
1 pair tin shears	1 00	
1 " pinchers	50	
1 square	1 25	
1 hand saw	1 00	
3 bits	75	
1 brace	1 00	
1 cold chisel	1 00	
1 smoothing plane	1 00	
3 chisels	1 00	1 25
1 putty knife	25	
1 pair plyers	25	
1 awl	75	
1 shovel	50	
1 hatchet	25	75
2 compasses	50	
1 gimlet	25	
1 soldering iron	50	
1 glue pot	50	
1 screw driver	50	50

	Value.	Cost.
Sept. 30. 3 axes.....	\$2 25	
1 wood saw.....	25	
1 grindstone.....	1 50	
1 scythe and snath.....	1 50	
2 hoes.....	50	
1 pair nippers.....	25	
1 wheelbarrow.....	2 50	\$5 00
1 ash pail.....	50	
1 glazier's diamond.....	6 00	6 50
2 oil cans.....	50	
1 oiler.....	30	40
1 bar wrench.....	1 00	
2 water bibbs.....	4 50	4 50

Furniture, etc., in Halls.

50 yards matting.....	2 50	
1 hall clock.....	30 00	
1 hat rack.....	5 00	
1 oil tank.....	3 00	
1 " pump.....	1 00	
1 step ladder.....	2 50	
1 oil can, 2 gallons.....	40	
1 " $\frac{1}{2}$ gallon.....	15	
1 $\frac{1}{4}$ gallon measure.....	15	
1 $\frac{1}{2}$ " ".....	20	
1 1 " ".....	30	
1 lantern.....	1 00	
2 pumps and pipe.....	8 00	
1 iron ashpail.....	25	
1 sprinkling pot.....	1 00	
1 wood box.....	2 50	
1 dust pan.....	25	
2 brooms.....	40	50
1 hanging lamp.....	2 50	
2 " lamps.....	2 50	
4 " ".....	4 00	
3 bracket ".....	1 50	
2 iron kettles.....	75	
2 pad locks.....	1 00	
3 tin collars.....	1 00	
1 curtain and fixture.....	1 50	1 50
1 box glass.....	4 50	4 50
1 " ".....	4 00	4 00
2 rat traps.....	1 00	1 20
3 mouse traps.....	45	45
1 handle basket.....	40	
3 chairs.....	2 25	
1 table.....	4 00	

Furniture in Students' Room.

9 stoves, No. 25.....	63 00	72 00
12 zinc boards.....	12 00	19 50
77 lbs. stove pipe.....	5 39	7 70
7 elbows.....	1 05	1 75
15 stoves, pipe, and zinc.....	60 00	
6 " " " ".....	12 00	
3 bedsteads.....	12 00	13 50
18 " ".....	58 50	63 00
17 " ".....	42 50	51 00
10 " ".....	15 00	
5 " ".....	20 00	
9 " ".....	9 00	

Horse, Wagon, Cutter, &c.

1 horse.....	175 00	150 00
1 wagon and extra pole.....	130 00	

	Value.	Cost.
Sept. 30. 1 cutter and extra pole.....	\$15 00	
1 harness.....	15 00	
1 horse blanket.....	2 50	\$3 25
1 " ".....	75	
1 curry-comb.....	30	30
1 brush.....	1 25	1 25
1 measure.....	20	
1 halter.....	50	
1 surcingle.....	1 00	1 20
1 fly blanker.....	50	1 00
1 rubber oil cloth.....	1 50	2 25
1 whip.....	1 50	2 00

Invoice of Provisions on Hand.

700 lbs. flour, @ \$2.75.....	\$19 25
150 lbs. lard, @ 13 $\frac{3}{4}$ c.....	19 87
126 lbs. butter, @ 22c.....	27 72
25 doz. eggs, @ 12 $\frac{1}{2}$ c.....	3 13
194 lbs. beef, @ 7c.....	13 58
70 bushels potatoes, @ 75c.....	52 50
3 $\frac{1}{2}$ barrels pickles, @ \$5.00.....	17 50
$\frac{1}{2}$ barrel salt.....	75
350 lbs. tallow, @ 6c.....	21 00
175 " honey, @ 15c.....	26 25
25 " cheese, @ 11c.....	2 75
30 squash, @ 7c.....	2 10
40 gallons vinegar, @ 16c.....	6 40
30 " molasses, @ 65c.....	19 50
50 " syrup, @ 73c.....	36 50
500 lbs. gra. sugar, @ 11 $\frac{1}{2}$ c.....	57 50
100 " A, " " 11 $\frac{1}{4}$ c.....	11 25
100 " brown " " 8 $\frac{1}{2}$ c.....	8 50
150 " dried apples, @ 8c.....	12 00
30 " oat meal, @ 5c.....	1 50
128 " coffee, @ 28c.....	35 84
5 " tea, @ 60c.....	3 00
14 " corn starch, @ 10 $\frac{1}{4}$ c.....	1 43
26 " soda, @ 8c.....	2 08
10 " allspice, @ 22c.....	2 20
6 " pepper, @ 25c.....	1 50
3 " mustard, @ 33c.....	99
10 " cinnamon, @ 60c.....	6 00
4 " hops, @ 35c.....	1 40
7 " ginger, @ 25c.....	1 75
16 " baking powder, @ 28c.....	4 48
8 " cream tartar, @ 35c.....	2 80
1 " cloves.....	70
2 " nutmeg, @ \$1.25c.....	2 50
2 " sage.....	1 00
10 " tapioca, @ 8c.....	80
10 " sago, @ 9c.....	90
25 " prunes, @ 9c.....	2 25
$\frac{3}{8}$ gallon extract vanilla, @ \$16.50.....	6 18
$\frac{3}{4}$ " " lemon, @ \$8.00.....	6 00
$\frac{1}{2}$ box raisins, @ \$3 50.....	1 75
crab apple pickles.....	2 00
jelly.....	3 50
chopped tomato pickle.....	2 50
$\frac{1}{2}$ barrel table salt.....	1 75
105 lbs. soap, @ 6 $\frac{1}{2}$ c.....	6 82
3 barrels soft soap.....	9 00
$\frac{1}{2}$ box Pride of the Kitchen soap.....	3 00

Light Account.

25 gallons oil, @ 38c.....	9 50
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COLLEGE ACCOUNTS.

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	Cost.
3 doz. No. 2 chimneys, @ 75c.....	2 25
3½ doz. No. 1 " @ 60c.....	2 10
2 doz. boxes matches.....	1 08
12 oil barrels.....	6 00

Washing Account.

170 lbs. soap, @ 7½c.....	12 75
21 " S. G. starch, @ 9c.....	1 89
½ doz. bottles blueing, @ 75c.....	37

Wood Account.

18 cords 4 feet wood, @ \$2.00.....	36 00
12 " " " " @ \$2.50.....	30 00
120 " " " " @ \$2.25.....	270 00
99 " 3 feet " " @ \$2.00.....	198 00
101 " " " " @ \$1.75.....	176 75
84 " 18 inch " " @ \$1.25.....	105 00
3½ tons coal, @ \$8.50.....	29 75

Team Account.

5 bushel oats, @ 45c.....	2 25
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Schedule of Invoice of Boarding Hall.

Sept. 30. Bedding, table linen, etc.....	221 69
furniture in public parlor.....	285 30
" parlor bedroom.....	83 80
" room No. 46.....	32 00
" rooms No. 42 and 44 with other articles.....	68 90
office furniture.....	33 20
employés room furniture.....	62 15
private rooms ".....	144 10
wash " ".....	30 15
ironing " ".....	46 55
store room furniture.....	16 25
furniture in cellars.....	116 05
" kitchen.....	121 18
" dining room.....	622 13
tools.....	121 00
furniture and other articles in the halls.....	89 95
" in students' rooms.....	310 44
horse, wagon, cutter, etc.....	345 00
	<hr/>
Provisions, fuel, etc., on hand.....	\$2,749 75
	<hr/>
	\$1,357 36

FARM HOUSE INVENTORY, SEPT. 30, 1876.

1 rocking chair, cane.....	\$4 00
1 " " " small.....	1 00
2 arm-chairs.....	6 00
1 " wood.....	2 00
6 sitting-room chairs.....	10 00
12 dining " ".....	10 00
8 flag-seat ".....	4 00
6 wood-seat " mens' room.....	4 50
1 dining table.....	12 00
1 round top table, large.....	6 00
1 " " small.....	3 00
1 common ".....	2 00
1 " " with drawers.....	5 00
4 wash stands, " ".....	20 00
1 " " poor, " ".....	2 50
3 small stands, " ".....	2 25
5 bedsteads.....	20 00
2 " ".....	2 50

3 mirrors, large.....	\$4 00
1 " medium.....	1 25
3 small mirrors.....	1 50
60 yds. old carpet.....	10 00
1 sitting room carpet, 25 yds.....	25 00
1 couch, old.....	10 00
22 window shades.....	6 00
2 " " new.....	1 80
3 clocks.....	9 00
6 chambers.....	5 00
4 wash bowls and pitchers.....	5 00
1 " " plain.....	50
1 hall lamp.....	1 25
8 common lamps.....	3 00
1 argand burner, new.....	1 00
17 comforters.....	36 00
5 blankets.....	5 00
7 red spreads.....	14 00
28 sheets.....	14 00
33 pillow slips.....	4 00
5 mattresses (top of straw ticks).....	2 50
4 " hair.....	4 00
9 straw ticks.....	18 00
5 table cloths.....	7 50
5 large hand towels.....	2 00
13 small white hand towels.....	1 95
5 " brown " ".....	1 00
4 dish towels.....	50
2 combs and brushes.....	1 50
1 set table screens.....	85
1 table brush.....	1 00
3 vegetable dishes.....	2 50
1 glass sauce dish.....	1 50
2 water pitchers.....	1 50
2 cream ".....	50
1 earthen " old.....	50
1 large platter.....	2 00
3 small platters.....	2 25
1 butter dish.....	75
3 table mats.....	38
8 dinner plates.....	80
13 tea ".....	1 50
12 breakfast plates.....	2 00
12 pie plates.....	1 25
2 baking plates.....	15
13 tea cups.....	75
21 saucers.....	1 25
10 coffee cups and 13 saucers.....	3 00
12 sauce plates.....	75
8 butter cups.....	40
6 goblets.....	75
1 sugar bowl.....	50
12 salts.....	1 20
9 table spoons.....	3 25
15 tea spoons.....	4 00
1 butter knife.....	30
1 carving knife and fork.....	1 50
1 " " old.....	10
40 butcher knives.....	20
15 knives and 19 forks.....	3 00
5 white bowls.....	60
9 soup plates.....	1 35
2 sugar buckets.....	75
1 strainer.....	38
2 milk pails.....	1 00
1 radish grater.....	25

3 drippers.....	\$0 75
13 baking tins.....	1 50
10 patty ".....	75
3 tea pots.....	1 50
1 coffee pot.....	75
1 " boiler.....	75
10 milk pans.....	1 50
2 2-quart pails.....	50
1 steamer.....	50
2 coffee mills.....	75
1 cake cutter.....	10
1 cake turner.....	15
1 chopping knife.....	18
1 potato masher.....	10
1 rolling pin.....	12
1 iron spoon.....	15
1 " ladle.....	25
1 flour board.....	10
1 " bbl.....	30
1 tin tunnel.....	25
1 flour scoop.....	38
5 spice boxes.....	40
5 wooden boxes.....	50
1 nutmeg grater.....	25
1 2-gal. jug.....	25
1 1-gal. ".....	15
1 ½-gal. ".....	15
2 flour sieves.....	50
14 lamp chimneys and wicks.....	1 40
4 colander.....	50
1 cream tartar can.....	25
15 1-qt. glass jars.....	2 19
18 2-qt. " ".....	3 75
3 dust pans.....	45
1 qt. measure.....	25
1 wooden bowl.....	50
1 egg beater.....	75
1 dinner bell.....	1 00
2 oil cans, tin.....	1 25
1 sausage cutter.....	2 00
2 ½-bushel baskets.....	75
1 willow basket, old.....	17
2 fly traps (Hoosier).....	1 60
1 mop.....	25
6 brooms.....	2 10
1 set clothes bars.....	50
1 clothes line.....	25
1 wash board.....	25
1 clothes wringer.....	4 00
3 wash tubs.....	2 50
1 clothes basket.....	1 00
3 wash dishes, tin.....	50
6 wood pails.....	1 00
6 doz. clothes pins.....	50
25 gals. of crocks (diff. sizes).....	3 00
2 soap bbls.....	1 00
1 pounding bbl.....	1 00
3 cider and vinegar bbls.....	4 50
1 pounder.....	50
3 pork bbls.....	3 75
1 tea kettle, new (tin).....	1 00
1 ice cream freezer.....	3 00
2 slop buckets.....	2 25
1 wood saw.....	1 25
1 wash bench.....	50
12 common bbls (for storage).....	1 50

1 refrigerator.....	\$25 00
1 safe.....	5 00
1 cook stove and furniture.....	50 00
2 sheet-iron stoves, zinc, and pipe.....	20 00
1 box stove and boiler (copper).....	10 00
3 box stoves, zinc, and pipe.....	18 00
1 new wash boiler.....	3 50
1 ash pail.....	50
1 fire shovel and tongs.....	50
1 flat-iron holder.....	25
6 flat-irons.....	3 00
2 new irons.....	1 00
2 fire pokers.....	25
1 shovel stand.....	50
1 fire pan.....	25
1 spider, not in use.....	25
1 cake griddle.....	25
3 iron kettles.....	2 50
1 small keg and faucet.....	1 00
167 lbs. sugar, at 11 $\frac{1}{4}$ c.....	19 83
27 bush potatoes, @ 50c.....	13 50
5 $\frac{1}{2}$ bbls. apples, @ 75c.....	4 13
46 lbs. soap bars, @ 61 $\frac{1}{2}$ c.....	2 99
12 galls. soft soap, @ 12 $\frac{1}{2}$ c.....	1 50
12 lbs. codfish, @ 8c.....	96
14 lbs. lard, @ 13c.....	1 82
$\frac{1}{4}$ bush. beans, @ \$1.60.....	40
2 doz. eggs, @ 11c.....	22
44 lbs. honey, @ 20c.....	8 80
10 lbs. butter, @ 20c.....	2 00
3 gal. pickles, @ 15c.....	45
$\frac{3}{4}$ bush. onions, @ \$1.00.....	75
200 lbs. flour, @ \$3.00.....	6 00
25 lbs. dairy salt, @ 2c.....	50
$\frac{1}{2}$ gal. syrup, @ \$1.00.....	50
4 qts. jelly, @ 25c.....	1 00
3 $\frac{1}{2}$ lbs. tea, @ 62c.....	2 17
5 $\frac{1}{2}$ " coffee, @ 28c.....	1 54
1 oz. nutmegs.....	25
2 oz. cloves (ground), @ 10c.....	20
$\frac{1}{3}$ bot. ext. lemon.....	35
$\frac{2}{3}$ " " vanilla.....	65
1 lb. pepper.....	25
$\frac{1}{2}$ lb. ginger, @ 25c.....	12
5 lbs. cream tartar, @ 35c.....	1 75
1 bbl. cider.....	2 00
4 gal. vinegar, @ 30c.....	1 20
30 cords wood, @ \$1.50.....	45 00
1 package tomatoes.....	60
14 qts. canned tomatoes.....	1 75
29 " " berries and cherries, @ 40c.....	11 60
3 lbs. halibut, @ 12 $\frac{1}{2}$ c.....	37
1 $\frac{3}{4}$ lbs. hops, @ 35c.....	53
1 pk. peppers.....	50
2 lbs. baking powder, @ 28c.....	56
2 oz. cinnamon.....	15
20 lbs. rock salt, @ 1 $\frac{1}{4}$ c.....	25
4 boxes matches, @ 6c.....	24
5 lbs. starch, @ 10c.....	50
1 lb. mustard.....	40
1 lb. tapioca.....	10
25 lbs. Graham flour, @ 3c.....	75
4 " cracked wheat, @ 5c.....	20
20 " corn meal, at 2c.....	40
7 " dried apples, @ 10c.....	70
1 lb. prepared cocoanut.....	40

6 lbs. brown sugar, @ 11c.....	\$0 66
1 gal. washing fluid.....	37
4 lemons, @ 60c.....	20
1 pk. crab apples, preserved.....	1 50

Total \$709 46

Dr.

Inventory Dec. 1, 1875.....	\$721 71
Bills Dr.....	1,040 77

Debits \$1,762 48

Cr.

Inventory Sept. 30, 1876.....	\$709 46
By receipt.....	50
306 6-7 weeks' board, @ \$3.43.....	1,052 52

Credits \$1,762 48

INVENTORY OF CHEMICAL DEPARTMENT, 1876.

Furnace.....	\$200 00
3 reagent cases.....	75 00
1 book case.....	50 00
Table and reagent racks.....	90 00
Waste lead and pipes.....	25 00
Copper still and condenser.....	30 00
Copper pneumatic cistern.....	50 00
5 tables.....	36 00
6 chairs.....	22 50
3 stoves and pipes.....	40 00
1 clock.....	3 50
Suite of mineral specimens.....	125 00
1 Holtz electrical machine.....	115 00
1 induction coil, Ruhmkorff's.....	337 50
Battery for same.....	40 00
Grove's battery.....	25 00
Bunsen's ".....	20 00
Smee's ".....	5 00
Daniell's " 3 cells.....	12 00
1 electrophorous.....	6 00
1 galvanometer.....	12 00
1 electrical machine, 36 inch plate.....	178 00
1 " battery.....	30 00
1 " balance.....	10 00
1 set cavalry riders.....	8 00
1 sportsman and jar.....	8 00
1 plate and dancing images.....	5 00
2 diamond jars.....	5 00
3 Leyden jars.....	6 00
1 dissected jar.....	3 00
1 insulated prime conductor.....	5 00
1 nitrogen flask.....	5 00
1 auroral tube.....	8 00
1 electrical egg.....	5 00
1 " light.....	2 50
10 Geissler tubes.....	20 00
1 Clark's magneto-electric machine.....	45 00
3 sets apparatus for elect. rotation.....	36 00
11 magnets.....	9 40
1 magnetic needle (mounted).....	3 00
1 " " (astatic).....	5 00
1 dipping needle.....	8 00
1 " Mahomet's coffin".....	5 00
1 electro-magnet.....	3 00
2 magneto-induction apparatus.....	5 00

1 De La Rives ring	\$5 00
2 electro-magnetic machines	30 00
5 lbs. insulated wire	5 00
1 lb. " " silk	3 50
1 polariscope	35 00
1 polarizing apparatus	7 50
3 prisms	15 00
1 air pump (mounted)	75 00
1 " " table	25 00
3 receivers for air pump	15 00
1 mercury tube for air pump	5 00
1 condensing syringe	5 00
1 force pump	15 00
1 colepile	5 00
Glazier's diamond	7 00
Chemical balance and weights	115 00
Common balance and weights	7 50
Madgeburg hemispheres	10 00
Glass household pump	15 00
Graduated bell glass	7 50
Compound blow-pipe and reflector	10 00
Set meteorological instruments	175 00
Platinum apparatus	80 00
1 doz. hydrometer jars	3 50
Hydrometer and sp. gr. bottles	12 50
Nicholson's hydrometer	9 00
5 porcelain tubes	7 00
40 specie jars	7 00
3 aspirators	6 00
2 phosphorus globes	3 50
30 retorts	45 00
10 condensers	20 00
38 retort stands	57 00
200 flasks	120 00
55 Hessian crucibles	2 40
7 black lead crucibles	3 50
18 precipitating jars	10 00
16 hydrometer jars	8 50
51 porcelain mortars	51 00
2 iron mortars	2 50
92 alcohol lamps	92 00
1100 reagent bottles	210 00
74 glass funnels	38 00
90 beakers	9 00
36 salt-mouth bottles	9 00
7 porcelain ladles	8 75
1 set chemical specimens	150 00
12 chloride of calcium tubes	6 00
4 safety tubes	3 00
1 chloride of calcium jar	1 00
1 mercurial cistern	3 00
3 glass mercury jars	6 00
1 copper drying bath	8 50
7 Woulf's bottles	10 00
30 porcelain crucibles and covers	15 00
2 two-necked bottles	2 00
6 doz. watch glasses	18 00
1 apparatus for decomposing water	8 00
2 Davy's safety lamp	8 50
2 Berzelius' lamps	15 25
1 Liebig's condenser	5 50
20 receivers	50 00
5 rubber gas bags	25 00
40 feet rubber tubing	12 00
2 lbs. rubber corks	12 00
1 Liebig's furnace	7 50

10 potash bulbs.....	\$6 50
5 graduated measures.....	5 00
5 litre measures and 20 burettes.....	65 00
3 alkalimeters.....	4 00
7 burette holders.....	7 00
1 trallis alcoholometer.....	2 00
1 agate mortar.....	6 00
1 diamond mortar (steel).....	3 00
1 pirometer.....	7 00
1 brass ball and ring.....	2 00
4 graduated tubes.....	4 00
4 lead crucibles.....	4 00
Rose's models of crystals.....	18 00
Cooper's receiver.....	1 00
4 crucible tongs.....	5 00
3 doz. steel forceps.....	6 00
6 evaporating dishes.....	5 00
1 Rammelsburg drying oven.....	3 00
1 bolt head and cap.....	3 00
Aniline colors.....	7 00
50 test tube racks.....	20 00
5 lbs. glass rods.....	3 00
3 lbs. " tubing.....	2 50
2 gas pistols.....	5 00
1 vise.....	3 50
1 air pump clock.....	8 00
2 dessicating apparatus.....	11 50
1 Morse's telegraph model.....	25 00
1 Marshe's arsenic apparatus.....	3 50
1 Papin's digester.....	25 00
2 copper blast lamps.....	10 00
1 mounted gun lock.....	5 00
1 Wallaston's cryaphorous.....	3 00
2 water hammers.....	2 00
1 pulse glass.....	1 00
2 eudiometers.....	8 00
2 valve globes for air pump.....	3 50
2 chemical thermometers.....	6 00
1 Leslie's dif. thermometer.....	8 00
4 blow pipes and lamps.....	12 00
Dobereiner's lamp.....	8 00
6 sheets colored glass.....	5 00
10 lbs. mercury.....	10 00
10 lbs. sulphide of ammonia.....	8 00
Mitscherlich gas furnace.....	18 00
25 acid bottles.....	3 00
7 reagent bottles, glass labels.....	10 00
Mounted steelyard.....	5 00
5 porcelain sink bowls.....	15 00
1 H ₂ S case and stand.....	8 00
1 air pump tripod.....	15 00
2 step ladders.....	6 00
10 pairs shears.....	8 00
53 wash bottles (small tube).....	26 50
20 " " (large ").....	8 00
Charcoal points for battery.....	3 50
2 double filter stands.....	2 50
4 burette holders.....	8 00
Plattner's mould.....	2 50
3 bell glasses.....	2 70
1 funnel tube, stoppered.....	1 00
Wheat sample bottles.....	3 00
$\frac{1}{2}$ gross chloroform bottles.....	11 50
Turned wood boxes.....	2 00
6 cylinders on foot.....	4 50
1 lb. phosphorus.....	1 00

1 assay furnace.....	\$50 00
1 muffler for furnace.....	1 25
1 Hoffman's tube.....	5 00
2 lbs. copper wire, No. 19.....	1 20
2 cork knives.....	30
1 stone for knives.....	12
2 graduated tubes, 50 c. c.....	2 00
1 support.....	2 50
2 muffles.....	1 00
1 hydrometer, 30 heavy.....	1 00
1 doz. cupels.....	50
1 " ".....	1 00
1 pair double bellows.....	6 00
1 iron mortar (large).....	1 25
1 doz. glass jars (gallon).....	5 50
1 balloon, 16 inch.....	2 50
1 air pump.....	200 00
1 fountain in vacuo.....	7 00
1 water hammer.....	2 00
1 thermo-multiplier.....	30 00
1 reflector.....	50 00
1 air syringe.....	3 00
1 electrical swing.....	5 00
1 lightning jar.....	2 50
1 luminous globe.....	9 00
1 " tube.....	4 00
1 Gassiot's Cascade.....	3 50
1 galvanometer.....	20 00
1 electro magnet.....	12 50
1 stratification tube.....	5 00
1 Nichol's prism.....	20 00
1 phosphorous tube.....	2 50
1 mercury ".....	4 50
1 spectrum ".....	2 00
1 " ".....	2 00
1 fluoride of silicon.....	2 00
1 achromatic prism.....	10 00
1 phosphorus tube.....	6 50
1 Geissler tube.....	5 00
1 " ".....	5 00
1 Newton's rings.....	12 00
1 rhomb calc spar.....	10 00
1 tourmalines.....	5 00
1 selenite.....	2 50
1 selenite.....	2 50
1 quartz.....	3 50
1 plate arragonite.....	4 00
1 rod shellac.....	2 00
1 doz. quart bottles.....	2 00
1½ " evaporating dishes.....	5 40
1 " retort stands.....	15 00
1 set aluminum weights.....	50
1 iron twine box.....	1 00
3 nests small funnels.....	1 50
2 doz. varnish sample bottles.....	4 50
1 " porcelain mortars.....	6 50
1 " chemical flasks.....	3 00
2 bell glasses, ½ gal.....	2 50
½ doz. coin test bottles.....	2 25
½ " precip. jars, 2 quart.....	4 50
½ " " 1 ".....	3 00
3½ lbs. stool feet.....	1 58
5 " glass tubing, heavy.....	3 75
10 " solid glass rods.....	5 00
2 gross large test tubes.....	7 00
2 doz. small " ".....	40

6 nests beakers, 2 oz. to 1 qt.	\$13 50
24 feet rubber tubing, $\frac{1}{8}$ "	1 92
12 " " " $\frac{3}{4}$ "	4 56
50 rubber corks, No. 2	2 00
50 " " " No. 3	1 25
2 gro. H. vials, 2" dr.	3 00
1½ doz. spatulas B. H., 6 in	1 88
6 burette stands, double	12 00
12 pepettes, 30 c. c.	3 60
3 " 50 c. c.	80
50 lbs. hydrochloric acid, C. P.	15 50
42 " nitric acid	13 10
28 " " "	6 60
89 " liquor ammonia	14 46
5 " borax	1 25
10 " bi-carb. soda	80
12 " chlorate of potash	4 80
5 " Ferrocyanide potash	2 50
1 lb. indigo, Bengal	2 50
10 lbs. carb. ammonia	3 40
8 " acetate of soda	8 00
1 lb. iodide of potassium	3 60
1 " bromide "	1 00
2 lbs. nitrate of strontia	60
5 " " " lead	1 50
2 " " " cobalt	2 25
30 grammes plat. foil	1 20
2 " " wire	1 00
3 lbs. nitrate of barium	1 35
3 " molybdate ammonium	3 30
1 lb. microcosmic salt	1 60
2 gross 8-oz. tincture bottles	36 00
1 doz. chem. flasks, ½ pint	2 25
1 lb. chloroform	1 50
½ oz. morphine	75
1 lb. cyanide potash	1 00
2 lbs. caustic "	2 00
6 " " soda	5 00
3 " sulphite soda	1 00
1 lb. nitrate silver	24 00
10 lbs. sulphide iron	3 00
Maynooth battery	20 00
40 lbs. com. sulphuric acid	2 50
75 " " hydrochloric acid	3 00
Analytical balance	86 00
3 empty carboys	6 00
27 lbs. sulphuric acid, C. P.	8 45
Feather weight	18 00
Total	\$4,997 27

INVENTORY OF COLLEGE LIBRARY, SEPT. 30, 1876.

From inventory of 1875:		
3,700 volumes, etc.		\$7,414 34
Additions:		
By purchase, 181 vols., (cost)	\$658 78	
donations, 136 " (estimated)	75 00	
transfers, 11 " "	11 00	
		744 78
herd books (at farm office) 47 vols.		340 00
<i>Text Books and for Sale.</i>		
239 chemistries, @ \$1.00	\$239 00	
5 social songs, @ 60c	3 00	
2 " " @ 40c	80	
		242 80

Furniture, etc.

2 newspaper racks.....	\$20 00	
3 newspaper desks.....	45 00	
1 set drawers and cupboards.....	30 00	
3 large tables.....	12 00	
3 small ".....	•3 00	
3 step ladders.....	7 50	
2 cases (movable).....	13 00	
1 stove and pipe.....	25 00	
		\$155 50

Paintings and Pictures.

8 oil paintings (gifts).....	\$75 00	
13 photographs of persons and buildings.....	45 00	
10 maps, geographical and historical.....	50 00	
1 map of college farm.....	5 00	
		175 00
Total.....		\$9,052 42

INVENTORY OF GENERAL MUSEUM.

Collections.....	\$4,300 00
Cases.....	400 00
14 charts @ \$10.00.....	140 00
23 cases insects @ \$10.00.....	230 00
30 insect boxes @ 50c.....	15 00
2 breeding cases @ \$1.00.....	2 00
Fumigating box.....	8 00
Moistening can.....	50
2 doz. microscopic slides @ \$4.80.....	9 60
Dissecting scissors.....	1 50
2 prs. dissecting forceps @ \$1.50.....	3 00
Ink stand.....	1 00
2 doz. bottles for specimens @ \$3.00.....	6 00
2 jugs @ 30c.....	60
Total valuation.....	\$5,117 20

INVENTORY OF APIARY.

Improvement in grounds, spaces for hives, trees, screens, etc.....	\$100 00
Nineteen colonies bees, @ \$10.00.....	190 00
Comb honey, 100 lbs., @ 20c.....	20 00
Worker frames with honey, 100 lbs., @ 50c.....	50 00
11 bee hives, @ \$2.00.....	22 00
3 honey extractors.....	16 00
Work bench.....	5 00
3 honey knives.....	2 00
Scraper.....	75
8 feeders @ 25c.....	2 00
Honey box.....	2 80
30 feet lumber, @ 40c.....	1 20
Paint and oil.....	1 00
3 bee hats.....	1 55
Smoker.....	1 00

Tools.

Screw driver, 35c., chisel, 75c., square, \$2.25, saw, \$2.50, axe, \$1.50, jack-plane, \$1.25, bench screw, \$1.00, brace, 1.00, 3 bits, \$1.40.....	12 00
Total valuation.....	\$427 30

INVENTORY OF DEPARTMENT OF MATHEMATICS AND ENGINEERING.

	Cost.	Value.
One wye level.....		\$100 00
One levelling rod.....		10 00
One railroad compass (partially purchased by Class of 1878).....	\$20 00	50 00
One Vernier compass.....		30 00
One steel chain.....	7 20	7 20
Two iron chains, each 33 feet.....	4 00	4 00
One iron chain, 50 feet }.....	5 00	3 00
“ “ “ 40 “ }.....		
One set tally pins.....		25
Two pickets.....		75
One spherical block board.....	6 00	12 00
Friction apparatus.....		10 00
Apparatus to show fall of bodies.....		15 00
Cases in model museum.....		75 00
Collection of models.....		5,000 00

[REMARKS—The following inventory of models is made so as to show the case in which the models may be found. The classification will be seen to be imperfect, but for various reasons, chief of which is our present arrangement of cases, it is thought to be as good as possible. Case A is in the southwest corner of the room; Case B one north of case A; Case C north of case B, etc. The shelves are numbered 1, 2, 3, 4, and 5, from the top of each case.]

CASE A.

Shelf No. 1.

	No.
Models of gang and cultivator plows.....	24

Shelf No. 2.

Models of ordinary plows.....	20
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Shelf No. 3.

Model of ordinary plow.....	1
“ subsoil “.....	1
Models of steam plows.....	2
Model of snow plow.....	1
Models of ditching plows.....	2
Model of dead furrow plow.....	1
“ mole plow.....	1
“ roller “.....	1
Models of corn plows.....	3
Models of clevis to plow.....	1
“ mould board to plow.....	1

Shelf No. 4.

Models of potato diggers.....	8
“ colter scrapers.....	2
Model of stone extractor.....	1
“ border plow.....	1

CASE B.

Shelf No. 1.

Models of cultivators.....	14
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Shelf No. 2.

Models of cultivator.....	1
Models of clod crushers.....	5
“ rollers.....	3

Shelf No. 3.

Models of harrows.....	7
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Shelf No. 4.

Models of corn planters.....	8
“ hoes.....	7

Shelf No. 5.

	No.
Models of hay forks.....	3
Model of grain fork.....	1
Models of straw forks.....	2
Model of spading fork.....	1
“ horse hay fork.....	1
Models of rakes.....	3
“ shovels.....	2
Model of hay knives.....	1
“ post auger.....	1
“ poke.....	1
“ horse yoke.....	1
Models of ox yokes.....	4
Model of sheep yoke.....	1

Beneath Case B.

Models of miners' forks.....	3
Model of pitch fork.....	1
“ weeding hoes.....	1
“ hen coops.....	1
Models of bolts for grist mills.....	2
“ grain driers.....	2

CASE C.

Shelf No. 1.

Models of corn shellers.....	2
“ “ cider mills.....	2

Shelf No. 2.

Models of corn shellers.....	7
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Shelf No. 3.

Models of cutting boxes.....	5
Model of “ box knives.....	1

Shelf No. 4.

Models of cutting boxes.....	6
“ “ “ box knives.....	2

Shelf No. 5.

Model of cutting boxes.....	1
Models of fanning mills.....	2

Case Beneath.

Models of cutting boxes.....	2
“ “ bee houses.....	3
Model of hop kilns.....	1
“ “ “ bag.....	1
“ “ “ poles.....	1
“ “ “ holder.....	1
“ “ “ puller.....	1
Models of fruit crates.....	6

CASE D.

Shelf No. 1.

Models of cart.....	2
Model of ash cart.....	1
Models of wagons.....	3
Model of buggies.....	1
“ “ wheelbarrows.....	1

Shelf No. 2.

Models of sleighs.....	5
Model of ice sleighs.....	1
Models of carriage running gear.....	2

Shelf No. 3.

	No.
Models of wagon tongues	6
“ “ buggy thills	7

Shelf No. 4.

Models of buggy springs	7
“ “ seat	2
Model of buggy body	1
Models of neck yokes	2
Model of “ “ fastener	1
Models of whiffle trees	4
“ “ spring draught	2

Shelf No. 5.

Models of hubs	5
“ “ wheels	3
“ “ box axles	2
“ “ thill couplings	2
“ “ fellow fastenings	3
Model of wagon tires	1
“ “ “ tongues	1
Models of carriage clip	2
“ “ velocipedes	2

Beneath Case D.

Model of stock pens	1
“ “ “ feeder	1
“ “ packing box	1
“ “ rat and mice proof corn crib	1

CASE E.

Shelf No. 1.

Model of wheat cleaner	1
“ “ bran duster	1
“ “ flour mill	1
“ “ grinding mill	1
“ “ smut mill	1
“ “ mill spindles	1
Models of mill stones	2
“ “ riddles	2

Shelf No. 2.

Model of hominy mill	1
Models of threshing machines	2
Model of hopper	1

Shelf No. 3.

Model of grain shovel	1
“ “ “ dampener	1
“ “ “ drier	1
“ “ meal “	1
“ “ bag-holder	1
“ “ flour and bolt feeder	1

Shelf No. 4.

Models of hay presses	2
Model of hay press	1
Model of sifting machines	1
Models of self-holders for grindstones	3

Shelf No. 5.

Model of potato separators	1
“ “ corn protectors	1
Models of wool driers	2

Case Beneath.

Model of mechanical cattle feeder	1
Models of lime kilns	2

	No.
Model of preparing rubber.....	1
Models of horse powers.....	2
Model of distillery.....	1
“ “ clarifying cane juice.....	1
“ “ freezing apparatus.....	1
“ “ picker collar.....	1
“ “ purifying oil.....	1
“ “ preserving beer.....	1
“ “ suction box.....	1
“ “ loading coal.....	1
“ “ hinge joint.....	1
“ “ carburetting air.....	1
“ “ condenser.....	1
“ “ lever power.....	1
“ “ suspending turbine water wheel.....	1

CASE F.
Shelf No. 1.

Models of fruit pickers.....	5
Model of meat preserving machine.....	1
“ lard cooler.....	1
“ foot warmer.....	1
“ rasp.....	1
“ relief springs.....	1
Models of bug catchers.....	2
Model of starch machine.....	1
“ fruit tree protector.....	1
“ snap.....	1

Shelf No. 2.

Models of churns.....	4
Model of milk pail.....	1
“ “ “ stools.....	1
“ “ butter worker.....	1
“ “ “ cooler.....	1
“ “ egg dessicator.....	1

Shelf No. 3.

Models of washing machines.....	2
Model of corn popper.....	1
“ meat preserver.....	1
“ fat rendering machine.....	1
“ hydro-carbon lamp.....	1
“ oil lamp.....	1
“ stove and lamp.....	1

Shelf No. 4.

Models of stoves.....	5
Model of coffee roaster.....	1
“ “ fire place.....	1
“ “ heaters.....	1
“ “ chimney cap.....	1
“ “ coal scuttle.....	1
“ “ oil feeder.....	1
“ “ lamps.....	1
“ “ magnesia lamp.....	1

Shelf No. 5.

Model of boiler for greenhouse.....	1
“ “ oil furnace.....	1
“ “ “.....	1
“ “ fire register.....	1
“ “ “ extinguisher.....	1
“ “ peat machine.....	1
“ “ coal sifter.....	1
“ “ coal press.....	1
“ “ smoke house.....	1

Case Beneath.

	No.
Model of burning fluid apparatus.....	1
“ “ plan for controlling channels of alluvial rivers.....	1

CASE G.

Shelf No. 1.

Models of fences.....	6
“ “ gates.....	5

Shelf No. 2.

Models of ladders.....	3
“ “ stanchions.....	2
Model of paint mill.....	1
“ “ quartz crusher.....	1

Shelf No. 3.

Models of motor powers.....	3
“ “ crank movement.....	3
Model of rotary motion.....	1

Shelf No. 4.

Models of crank motions.....	2
“ “ friction chetches.....	3
Model of anti-friction rollers.....	1
“ “ connecting rods.....	1
“ “ ratchet treadles.....	1
“ “ transmitting motion.....	1
“ “ pulleys.....	1
Models of bolt cutters.....	3
Model of bolsters.....	1
“ “ double fulcrums.....	1

Shelf No. 5.

Model of button machines.....	1
“ “ rope “.....	1
“ “ pneumatic elevator.....	1
“ “ tripod.....	1
“ “ perpetual motion.....	1
“ “ dog power.....	1

CASE H.

Shelf No. 1.

Models of water wheels.....	5
Model of hydrostatic engine.....	1
“ “ plan for filling low lands.....	1

Shelf No. 2.

Models of saws.....	3
Model of saw setting machine.....	1
“ “ sawing machine.....	1

Shelf No. 3.

Models of brick machines.....	2
“ “ scraping machines.....	2
Model of planing machine.....	1
Model of pumps.....	5

Shelf No. 4.

Models of bark crushers.....	2
Model of turning lathe for iron.....	1
“ “ “ “ “ hubs.....	1
“ “ “ “ “ axles.....	1
“ “ boring machines.....	1
“ “ crushing ores.....	1

Shelf No. 5.

Model of looms.....	1
Models of shuttles.....	2

	No.
Model of thread throwers.....	1
“ “ cloth shearer.....	1
“ “ twisting machines.....	1
“ “ cleaning fibres.....	1
<i>Case Beneath.</i>	
Model of air powers.....	1
“ “ burglar alarms.....	1
“ “ marine engine regulators.....	1
“ “ gold extracting furnace.....	1
“ “ boring wells.....	1
CASE I.	
<i>Shelf No. 1.</i>	
Models of R. R. cars.....	9
Model of cow catcher.....	1
<i>Shelf No. 2.</i>	
Models of R. R. car wheels.....	6
“ hand “.....	3
Model of cattle car.....	1
Model of elevated rail cars.....	1
Models of rails.....	5
<i>Shelf No. 3.</i>	
Models of rails.....	6
“ switches.....	3
“ switch locks.....	2
Model of car ventilator.....	1
Models of car couplings.....	6
Model of frogs.....	1
“ rail and truck.....	1
<i>Shelf No. 4.</i>	
Model of filter.....	1
“ water trap.....	1
“ reclaiming lands.....	1
“ ventilating machine.....	1
Models of printing machines.....	2
Model of car.....	1
<i>Shelf No. 5.</i>	
Model of gas machines.....	1
“ “ horology.....	1
“ “ electrical machine.....	1
“ “ indicator.....	1
“ “ carburetted hydrogen engine.....	1
<i>Case Beneath.</i>	
Model of salt works.....	1
Models of beer coolers.....	3
Model of apparatus for measuring liquids.....	1
Models of gas machines.....	7
Model of spirit testers.....	1
“ “ sugar strainers.....	1
Models of sorghum machines.....	2
Model of stills.....	1
“ “ oil distilleries.....	1
CASE J.	
<i>Shelf No. 1.</i>	
Models of barn frames.....	1
<i>Shelf No. 2.</i>	
Models of bridges.....	6
<i>Shelf No. 3.</i>	
Models of bridges.....	2

	No.
Model of widening rivers.....	1
“ “ wrought iron beams.....	1
“ “ sub-marine tunnels.....	1
<i>Shelf No. 4.</i>	
Model of steam blowers.....	1
“ “ hydrostatic apparatus.....	1
“ “ hydraulic pile.....	1
“ “ pump valve.....	1
<i>Shelf No. 5.</i>	
Models of sugar boilers.....	1
“ “ wheel key.....	1
<i>CASE K.</i>	
<i>Shelf No. 1.</i>	
Models of evaporators.....	3
Model of steam cisterns.....	1
<i>Shelf No. 2.</i>	
Models of steam generators.....	3
Model of safety apparatus for boilers.....	1
“ “ hot blast apparatus.....	1
“ “ feed water heater.....	1
<i>Shelf No. 3.</i>	
Model of safety valves.....	1
“ “ injector for boilers.....	1
“ “ lubricator.....	1
Model of boiler feeders.....	5
Model of steam super-heaters.....	1
Models of “ traps.....	2
Model of governor.....	1
“ “ low water indicator.....	1
“ “ traction engine.....	1
<i>Shelf No. 4.</i>	
Models of road locomotives.....	2
“ “ improved safety valves.....	2
“ “ steam engines.....	4
<i>Shelf No. 5.</i>	
Model of water regulator in boilers.....	1
Models of boiler feeders.....	2
Model of condenser.....	1
“ “ steam pile driver.....	1

INVENTORY OF FURNITURE OF COLLEGE HALL.

	Cost.	Value.
12 old tables.....		\$12 00
150 chairs.....		45 00
5 arm chairs.....		7 50
3 “ “.....		12 00
1 table.....		10 00
3 stoves and pipe.....		24 00
2 “ “ “.....		20 00
1 “ “ “.....		5 00
1 “ “ “.....		2 00
1 “ “ “.....		6 00
30 black board rubbers.....		6 00
1 wood box.....		1 00
1 “ “.....		50
1 “ “.....		5 00
1 “ “.....		2 00
5 armed seats.....	\$54 25	55 00
1 chandelier.....	gift.	20 00
2 small chandeliers.....	“	5 00

	Cost.	Value.
25 yards carpet on rostrum.....		\$15 00
1 organ.....	gift.	50 00
6 brooms.....	\$1 25	1 25
2 lamps.....		2 00
1 dust pan.....		20
1 ash pail.....		1 00
1 wood carrier.....	1 25	1 25
1 sprinkler.....		1 00
Total.....		<u>\$309 07</u>

BOTANICAL MUSEUM.

	Cost.	Value.
7 Vick's chromos.....		\$18 00
1 compound microscope.....		75 00
4 botanical charts.....	\$15 00	15 00
75 slides for microscopes.....	45 00	45 00
20,000 plants, museum, etc.....	gift.	4,000 00
		<u>\$4,153 00</u>

INVENTORY OF COLLEGE PROPERTY IN THE PRESIDENT'S OFFICE.

	Cost.	Value.
1 carpet in back office.....		\$5 00
1 " " front ".....		2 00
3 curtains.....		1 00
1 desk.....		5 00
1 case of 12 pigeon holes.....		3 00
1 round table.....		5 00
1 table.....		4 00
1 rocking chair.....		5 00
2 arm chairs, @ \$3.00.....		6 00
2 " " @ \$1.00.....		2 00
5 chairs, @ \$1.50.....		7 50
1 set drawers with glazed case.....		30 00
1 ash book-case.....		5 00
1 pine book-case.....		10 00
1 clock.....		2 00
1 wash stand.....		3 00
1 slop pail.....		50
1 wash bowl.....		25
1 mirror.....		1 00
1 pitcher.....		50
2 tumblers, @ 5c.....		10
1 soap dish.....		10
2 wood boxes, @ 15c.....		30
2 side lamps, @ 50c.....		1 00
2 brackets for lamps, @ 50c.....		1 00
1 table lamp.....		1 00
4 lamp chimneys, @ 8c.....		32
2 chair cushions, @ 25c.....		50
30 pamphlet holders, @ 75c.....		22 50
40 file boxes, @ 40c.....		16 00
1 pen rack.....		25
1 pen rack on door.....		25
1 ink stand.....		25
6 pen holders, @ 2c.....		12
1 ruler.....		10
2 paper weights, @ 15c.....		30
1 rubber.....		03
1 lamp scissors.....		20
1 broom.....		15
1 stove and pipe.....		8 00

	Cost.	Value.
1 pair tongs.....		\$0 75
1 rack for tongs.....		1 00
1 spittoon.....		10
1 fire pan.....		25
1 framed picture of Dr. Cooley, collector of the Cooley Herbarium.....		1 00
1 chisel.....		25
439 two cent postage stamps.....	\$8 78	8 78
83 one " " ".....	83	83
18 three " " ".....	54	54
4 postal cards.....	04	04
269 three-cent stamped envelopes.....		
2 packages of large envelopes.....	16	16
14 packages of buff envelopes, @ 5c.....		70
6¼ lbs. writing paper, @ 33½c.....		2 08
52 steel pens.....		40
½ pint writing fluid.....		20
89 plain white letter envelopes.....		25
Also in charge of President 1 mail bag.....	6 50	6 00
Total valuation.....		<u>\$173 55</u>

INVENTORY OF SECRETARY'S OFFICE.

	Value.
1 safe.....	\$350 00
1 black walnut desk with pigeon holes, etc.....	20 00
1 cherry desk, drawers in front, pigeon holes, etc.....	25 00
1 case of pigeon holes in back room.....	10 00
1 book case.....	10 00
1 arm chair.....	3 00
4 cane-seat chairs.....	8 00
1 rocking chair.....	5 00
1 carpet.....	10 00
1 stove and fixtures.....	10 00
1 clock.....	10 00
1 barometer.....	2 00
1 pair of pincers and one tack hammer.....	1 00
1 ink stand.....	1 50
2 ink stands @ 50c.....	1 00
1 sponge dish.....	25
1 letter-file and 1 paper-file @ 25c.....	50
3 curtains.....	1 50
1 letter press.....	10 00
11 file boxes.....	5 00
1 pitcher and tumbler.....	1 00
1 pair of shears and pen-racks.....	1 50
3 rulers @ 50c.....	1 50
1 marking brush.....	10
1 ruling-pen.....	1 00
1 step-ladder.....	4 00
1 standing desk.....	5 00
1 large revolving chair.....	8 00
1 small " ".....	5 00
1 round table.....	2 50
Postage stamps.....	2 85
3 erasers @ 25c.....	75
2 reams note heads @ \$4.56.....	9 12
1 letter-book.....	1 50
1 gross Spencerian pens.....	1 25
½ dozen pencils.....	40
1 " penholders.....	25
6 " rubber bands.....	1 25
2 desk-knives @ 25c.....	50
16 quires letter heads @ 20c.....	3 20
1 map of Michigan.....	1 00

	Value.
2 pictures and frames @ \$1.00.....	\$2 00
2 vases @ 50c.....	1 00
1 slop-pail.....	1 00
1 lamp.....	1 25
	<hr/>
	\$540 67

SUMMARY OF INVENTORY.

Farm, 676 acres, @ \$70.00.....	\$47,320 00	
Buildings.....	148,483 00	
Farm Department.....	19,232 89	
Machines, tools, hardware, furniture, etc.....	\$3,196 11	
Crops.....	3,154 35	
Wood, coal, manure, ground feed, etc.....	1,095 33	
Team.....	900 00	
Stock.....	10,886 50	
Farm House.....		709 46
Furniture, provisions, etc.....	\$709 46	
Horticultural Department.....		6,164 77
Greenhouse plants.....	\$3,097 50	
" appurtenances.....	327 25	
Implements, lawn and garden tools, office furniture, team, produce, etc.....	2,740 02	
Chemical Department.....		4,997 27
Apparatus, chemicals, etc.....	\$4,997 27	
General museum.....		5,117 20
Library.....		9,052 42
Books, etc.....	\$9,052 42	
Botanical Museum.....		4,153 00
Plants, chromos, charts, etc.....	4,153 00	
Department of Mathematics and Engineering.....		5,317 20
Apparatus.....	242 20	
Collection of models.....	5,000 00	
Cases in model museum.....	75 00	
Boarding Hall—		
Horse and wagon, furniture.....		4,107 11
Utensils, etc.....	2,749 75	
Provisions, fuel on hand.....	1,357 36	
College Hall.....		309 07
Furniture, etc.....	309 07	
President's Office.....		173 55
Furniture, stationery, etc.....	173 55	
Secretary's Office.....		540 67
Safe, books, furniture, etc.....	540 67	
Apiary.....		707 30

DEPARTMENT REPORTS.

REPORT OF THE PRESIDENT.

The reports of the Faculty and of the various officers of the institution will give in detail the operations of the college for the partial year, from Dec. 1, 1875, to Sept. 30, 1876, inclusive. Previous reports have been made to cover the year from the first of each December to the 30th of the November preceding. In many respects the 30th of November makes a more convenient close than the present date, since the school year is not yet ended, the labor accounts are unsettled, and the farm crops not in a condition for exact measurement and valuation. The history of a given field made out for the fiscal year of the State (Sept. 30), is not such a year's history of the field as would generally be sought. A representation of these difficulties was made to the Chairman of the Committees on the College of the last Legislature, with the suggestion that our fiscal year should end Nov. 30. As nothing was done with the matter, we make our reports, as required, up to the close of the State fiscal year.

I refer with pleasure to the reports of the officers, as showing the spirit of study that has prevailed amongst the students, and the progress they have made in their lessons. The officers in charge of the work give a like testimony in regard to the labor of students. They have never worked with more regularity and faithfulness, and this feature of the College, the failure of which has been annually predicted, has grown stronger from the first day of the College.

It is often said that all labor-schools have failed, or else have abandoned the system. This may be true; but from the first the attempt has been made here to make the labor as much educational as possible, without having it lose its character of effective work. Class-room instruction and the labor are planned so as to illustrate each other. The practical and theoretical go hand in hand. Class instruction is given not in the class-room only, but in the barn-yard, the field, the orchard, the greenhouse, apiary, vegetable garden, and other places where work is done. I have, in several instances, met parties of students out upon the farm, examining what had been brought to their notice in the class room.

At the same time the students are taught to look upon their labor as that which should be effective, and like what they would themselves require of hired men.

The result of this system, and of the practical nature of the course of study

is seen in the fact that an increasing number of our graduates, after a four years' course, go into agriculture in some of its branches. The general catalogue issued this year and stitched in with the annual catalogue shows, out of one hundred and twenty living graduates, that forty-two are farmers, seven are fruit-growers, and eleven are professors and instructors in agricultural colleges. This is as large a proportion, it is believed, as law schools in the west send into the practice of the law. The class historian of the present senior class, that is to be graduated from the College the 22d of November next, says that thirteen out of seventeen of the class have fixed upon agriculture, in some of its branches, as a life business. Some of these came with no such intention, but have been brought to it through the general influence of the College.

The combination of work and class-room duties throws upon our professors an amount of labor that cannot be easily appreciated by those who measure the duties of a professorship by those in ordinary colleges.

The Faculty of the College has remained unchanged, except that Mr. R. C. Carpenter, the instructor in Mathematics, having received his appointment by the Board, instead of acting under the appointment of the President, has become a full member of the Faculty.

The officers have consisted of the President, five Professors, the Secretary, one Instructor and five Assistants and Foremen. The President is also Professor of Mental Philosophy and Inductive Logic. The Professor of English Literature has, in addition to work enough for one man in his own department, French and Political Economy. The attaining of accuracy and clearness in the expression of one's knowledge and opinions is too valuable an acquisition, both on its own account and for its reflex influence on the habits of observation and thought, to be made subordinate to other studies, and I sincerely hope such additional force may be granted at this time, as shall free the Professor from the larger part of the work outside of his department.

Each of the departments should stand apart from the others. There is enough work in each one to employ the best efforts of one officer. I am desirous that the Botanical department should be possessed of a good working laboratory, and that the Professor of Zoölogy and Entomolgy should be relieved of all instruction outside of his department. There is enough work in applied Mathematics for one instructor, and when the institution can afford it he should have no other classes to hear.

Towards the last of last year the Professor of Agriculture, Mr. A. B. Gulley, was severely poisoned, and the suffering from this cause lasted up to the autumn of this year, and interfered somewhat with the regularity of his attendance. During the spring term he gave instruction to the senior class in Agriculture. Owing to circumstances just named, the course was a short one. "The Handy-Book of Husbandry," by Geo. E. Waring, Tr., and other works on special subjects, were made the guides to free class-room discussions. The class has, from its first year, manifested great earnestness in the study of agriculture.

During the second term, Prof. Gulley gave instructions in agriculture to the Freshman Class. Waring's Drainage for Profit was used as a text-book in that subject, and the work of Goodale, the articles by Law and other writers used as guides in the matter of stock-breeding, and other subjects.

The assistant in Chemistry was permitted to be absent a part of the first term to help the Professor of Chemistry in Kansas Agricultural College, during a season of sickness. His place was supplied by an undergraduate of the college. Kansas Agricultural College has drawn from our graduates its Professor of

Chemistry and its Professor of Practical Agriculture. Its success, and that of every other Agricultural Colleges, will further our own prosperity.

The house occupied by the President stood upon an uneven piece of ground, rising to the west still higher than the site of the house itself. The land was stiff clay, and the pasture about it exceedingly poor. The land had been plowed and the house stood in a field of clay mud. An estimate was put in two years ago for grading and enriching the ground and constructing the drives in accordance with the plans of Mr. Adam Oliver, the College Landscape Gardener. As these estimates were stricken out by the Legislative committee, it was deemed necessary to commence work upon the grounds at once, by students' labor. The whole field east of the house and of the two new cottages has been underdrained, at great labor, and the work of grading and enriching has been going on throughout the season. The work has been in charge of Professor Gulley, and was of a nature to require his personal attention. This has thrown greater responsibility upon his foreman, Mr. C. L. Ingersoll, who has shown great competency for his difficult work.

The main entrance to the College has been changed from a place east of Professor Fairchild's house to a place west of the President's house, and the drive now follows the bank of the Cedar river, by the Apiary and the Chemical Laboratory to the College Hall. This river bank has great natural beauty, and it is not impossible the place may yet become what Governor Baldwin used to wish for it, the most beautiful in the State.

No insurance is kept upon the buildings or other property of the College. An estimate for insurance was inserted by the Board into the estimates for 1876 and 1877. These were cut out by the Legislative committees. There was at the time pending in the Legislature a joint resolution that State property should not be insured. This did not pass, but the item for insurance having been omitted from the appropriations, seemed to express the opinion of the law-making power that no money should be expended for that purpose. I think some other institutions have effected insurance on their property, although it is in reality State property.

Early in the present year the first series of Farmers' Institutes under the direction of the Board were held. A very exact regard to dates would have deferred an account of them to the present volume. As, however, the report for 1875 was not issued until after their close, a full account of the institutes was given in that volume, pages 72 to 314, inclusive. The volume for the present year may very likely be left incomplete in order to insert the account of the series of six institutes set down for January, 1877.

The Report for 1875 contained also (pages 377 to 390, inclusive,) some account of the collections made for the Centennial International Exhibition in Philadelphia. The present volume will contain additional matter regarding them.

The present college year, as already intimated, has been a very successful one so far as the studies and work of students are concerned. The Centennial Exhibition has broken in somewhat upon the regularity of attendance, and the continued financial distress of the country is telling very hardly on our students, most of whom are largely dependent for support upon their own earnings. The employment of inferior teachers and the lessening of teachers' wages the coming winter will embarrass them still more. Several excellent students have been compelled already to suspend their studies for these reasons.

So far as the government of the students has depended upon myself, I have given more into the hands of the students themselves than ever before. The

rules of the organization known as the "Students' Government" for order in the halls have been read or referred to frequently. The students of the different tables in the dining-room have chosen their own carvers and captains, whose duty it was to maintain order and propriety of conduct. Students have been reasoned with and then, where the case would admit of it, left to decide for themselves as to their conduct, in particular instances. The plan has been partly successful, and partly not.

Personally, I took part in four of the Farmers' Institutes, and made for the pamphlet compiled under authority of the Governor in the interests of Emigration, a history and sketch of the College, a brief condensation of which appeared in the pamphlet. I also compiled a fuller history for the Centennial Commission, besides several tabular statements for various statistical works on the country.

During the College year I have given instruction to the Seniors,—in the first term, in Mental Philosophy; in the second term, in Moral Philosophy, a study usually in charge of Professor Fairchild, and in the third term, in Inductive Logic. I also had the Seniors in the Constitution of the United States one-half of the second term. I have also read with them on Friday evenings the first three books of Milton's *Paradise Lost*, and we are now engaged upon the fourth. This reading was at their earnest and reiterated request. I have given two lectures before the whole body of students, one on the study of United States history, and one on Webster's reply to Hayne.

I have taken charge of the morning religious services. These are not made occasions of discipline, unless at long intervals, by Faculty direction; but are made occasions of frequent short lectures on various topics. I am at present giving a series of such talks on the management of winter district schools. The whole exercise is one quarter of an hour long.

The Sabbath services are under my charge, and the desk has been supplied as follows:

- Feb. 27—President Abbot.
- Mar. 5—Secretary Baird.
- “ 12—President Abbot.
- “ 19— “ “
- “ 26—Rev. D. Crosby.
- April 2—Rev. E. Cooley, Jr.
- “ 9—Secretary Baird.
- “ 16—President Abbot.
- “ 24—Rev. Charles Simpson.
- “ 30—Rev. J. Malvern.
- May 7—Professor Daniells, of Olivet College.
- “ 14—Rev. C. R. Wilkins.
- “ 21—Rev. H. Slade.
- June 4—Rev. T. P. Prudden.
- “ 11—Secretary Baird.
- “ 18—President Abbot.
- “ 25—Rev. A. A. Rolfe.
- July 2—Rev. E. Cooley, Jr.
- “ 9—Rev. T. P. Prudden.
- “ 16—President Abbot.
- “ 23—Rev. Charles Simpson.
- “ 30—President Abbot.

- Aug. 6—Rev. D. Crosby.
 “ 13—Rev. John Malvern.
 “ 20—Rev. H. Slade.
 Sept. 3—Rev. T. P. Prudden.
 “ 10—President Abbot.
 “ 17—Rev. C. R. Wilkins.
 “ 24—Rev. Dr. Duffield, of Ann Arbor.

The clergymen whose residences are not given, all come from the city of Lansing. The Catholic clergyman does not think it consistent with his duties to officiate at the College; the Rev. Mr. Clark, rector of the Episcopal Church, was twice invited, but has not found it convenient to come; and the Rev. Mr. Cooley was kept from coming one Sabbath by a storm.

Eight Sabbaths remain before the close of the term, the last being the time of the baccalaureate sermon.

“The School,” published at Ypsilanti, and the “Grange Visitor,” have been sent to me regularly. The “Ballot-Box” has come part of the year. These, with several papers to which I am a subscriber, have been placed regularly in the Library.

The students proposed a contribution for the purchase of pictures for the public parlor and dining-hall. They raised more than \$30.00, and some members of the faculty contributed \$34.00, all of which were expended by a joint committee of faculty and students.

In the report for 1875, page 36, credit is given to Mr. P. W. Norris for specimens for the general museum. Mr. Norris afterwards requested the College to give him back his specimens, which was done.

The State Pomological Society’s Executive Committee held their winter business meeting at the College, in the house of Prof. Cook, who is a member of the Committee.

A few changes were made by the Faculty and approved by the Board in the labor system, the first of the year.

The distinction between regular and extra labor was abolished so far as compensation is concerned, and ten cents an hour fixed upon as the maximum rate to be paid. Three hours’ work is required daily as heretofore, for five days in the week.

The senior class has been equally divided between the Farm and Horticultural Departments. The first half, as divided alphabetically, worked the entire year in the Horticultural Department, the last half upon the Farm. The reason of this permanency of place for the seniors, was that they might be employed as foremen on jobs of work, or have charge under the professors of particular departments of it. To one was assigned the orchard, to another the apiary. So with the gathering of vegetables, the vineyard, and certain portions of the drainage. The plan has worked well, and has been of great advantage to the college.

The Juniors have been upon the Horticultural Department and the Sophomores upon the Farm, as heretofore, throughout the year.

The Freshmen were divided alphabetically into three divisions. Each division worked one term in the Horticultural Department, and two upon the farm. Special students were assigned in the same way as the Freshmen.

The change from two terms to three terms a year, which was entered upon the beginning of the year, made a readjustment of the scheme of study and of

the payment of bills necessary. The Faculty issued a circular with the new scheme, and other information in the winter.

T. C. ABBOT,
President.

STATE AGRICULTURAL COLLEGE, }
Lansing, Mich., Sept. 30, 1876. }

REPORT OF FACULTY.

To the State Board of Agriculture :

The Faculty of the State Agricultural College respectfully submit their annual report, as follows ;

Previous reports of the Faculty and of its several members have been made the 31st of December, after the full close of the College year, and have given an account of a complete year's work. The present date, the close of the fiscal year of the State, up to which by your direction our report is to be made, covers nine months, and finds us in session, the plans for the year, the studies and labors of the students being still incomplete.

A catalogue of officers and students was issued by the Faculty under your direction in August. Since its publication two students have been admitted to the Freshman class, viz. : Morse W. Jones, of Richland, Kalamazoo county, and Charles E. Sumner, of Lambertville, Monroe county. The whole number of students in attendance thus far during the year is, by classes, as follows :

Resident Graduates.....	5
Seniors.....	18
Juniors.....	16
Sophomores.....	45
Freshmen.....	72
Specials.....	10
Total.....	166

being an increase of ten over last year.

The numbers were kept within these limits only by greatly increased strictness in examination for admission. Many applicants failed to enter for lack of qualification. As some guide to a knowledge of the necessary preparation to be made in order to enter, some lists of questions used in the beginning of the year have been inserted in the catalogue, pages 43 and 44.

The average age of students by classes has been as follows, counting from the birth day last past. Probably one-half year should be added to each number for a more accurate average :

Resident graduates.....	23 $\frac{1}{4}$ years.
Seniors.....	21 5-9 "
Juniors.....	20 5-6 "
Sophomores.....	19 "
Freshmen.....	19 1-7 "
Specials.....	20 "

The counties of the State were represented as follows :

Allegan.....	6
Barry.....	3
Bay.....	1
Berrien.....	2
Branch.....	1
Calhoun.....	3
Cass.....	13
Clinton.....	3
Eaton.....	6
Genesee.....	1
Grand Traverse.....	5
Gratiot.....	4
Hillsdale.....	4
Ingham.....	23
Ionia.....	10
Jackson.....	4
Kalamazoo.....	4
Kent.....	6
Lapeer.....	3
Lenawee.....	6
Livingston.....	4
Macomb.....	1
Monroe.....	2
Montcalm.....	2
Muskegon.....	1
Oakland.....	14
Ottawa.....	1
Saginaw.....	2
Sanilac.....	1
Shiawassee.....	2
St. Joseph.....	2
Van Buren.....	7
Wayne.....	9

Total from this State.....	<u>156</u>
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STUDENTS FROM OTHER STATES.

California.....	1
Denmark.....	1
Indiana.....	5
Illinois.....	1
Nebraska.....	1
Ohio.....	1

Total from other States.....	<u>10</u>
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One of the resident graduates, a student in Analytical Chemistry, two of the Specials, and two of the Freshman class were ladies.

Several applications for admission were made by ladies, which were necessarily rejected for want of rooms.

The scheme of studies for 1876 has been as in the table below :

FIRST TERM.—BEGINNING FEBRUARY 23, 1876.

	8 A. M.	9 A. M.	10 A. M.	11 A. M.
Seniors -----	Agriculture.	Mental Philosophy.	-----	French.
Juniors -----	Mechanics.	Agricultural Chemistry.	-----	French.
Sophomores .	Botany. Horticulture.	Geometry.	-----	Elementary Chemistry.
Freshmen ---	Algebra.	Composition. History.	History. Composition.	Algebra.

SECOND TERM.—BEGINNING MAY 29, 1876.

	8 A. M.	9 A. M.	10 A. M.	11 A. M.
Seniors -----	Moral Philosophy.	-----	French.	Political Econo- my. Constitu- tion of U. S.
Juniors -----	-----	Mechanics. Entomology.	French.	Physics.
Sophomores .	Rhetoric.	Organic Chemistry. Blowpipe. and Volumetric Analysis.		Trigonometry. Surveying.
Freshmen ---	-----	Botany. Algebra.	Algebra. Botany.	Agriculture.

THIRD TERM.—BEGINNING AUGUST 30, 1876.

	8 A. M.	9 A. M.	10 A. M.	11 A. M.
Seniors	Civil Engineering.	Astronomy. Landscape Gardening.	-----	Logic.
Juniors	-----	Anatomy. Drawing.	English Literature.	Meteorology.
Sophomores ..	Analytical Chemistry.			Mechanics.
Freshmen	Botany. Book-keeping.	Botany. French.	Geometry.	French. Geometry.

All the students have had regular exercises in composition and declamations.

Since the issue of the last report, the College has lost, by death, a member of the last year's Freshman class, Mr. James C. Holtom, of Constantine, St. Joseph county. His name does not appear in this year's catalogue, but it is known that he intended to take the College course with his class. He was much esteemed as a faithful student, and as a young man of upright life, and much gentleness of spirit.

Lectures have been delivered before the entire College on Wednesday afternoons. The series, still incomplete, has been up to the present date (Sept. 30), as follows:

March 1.—By Geo. P. Sanford, Esq., Editor of the Lansing Journal, on Christian Element in Civilization.

March 15.—By Mr. R. C. Carpenter, on the Quadrature of the Circle.

March 29.—By President Abbot: The Study of United States History.

April 12.—By Dr. Kedzie: A Bar of Iron.

April 26.—By Professor Fairchild: The Discipline of College Drill.

May 10.—By Rev. C. R. Wilkins: Reserved Force.

June 21.—By the Rev. Mr. Day of Ann Arbor: Work.

July 19.—By Mr. Carpenter: The History of the Locomotive.

August 2.—By President Abbot: Webster's Reply to Hayne.

Aug. 16.—By Dr. Kedzie: Food.

Sept. 6.—By Professor Beal: Progress of Horticulture.

The junior exhibition was held on the afternoon of Tuesday, the 22d of August, and was participated in by all the seventeen members of the class. The day was pleasant, the audience, as usual, larger than the hall would receive, and the exercises, we believe, creditable to the institution.

The Alumni of the College held their triennial gathering August 23d, the day after the annual Junior exhibition. Just one-half of the one hundred and

twenty living graduates were present,—a grateful evidence of the esteem in which the College is held by them. Professor Prentiss, of the class of 1861, now Professor of Botany in Cornell University, delivered the public address. It consisted of a review, in the light of several years in its use, of the methods of education pursued in this institution. It was a thoughtful and candid testimony to the value of the educational work of the College.

Mr. John J. Kerr, of the class of 1871, gave a history of each graduated class and of its members, and the Rev. Oscar Clute, of the class of 1862 read a poem. The exercises were interesting and excellent throughout. The Bishop's Opera House Band of Detroit, that had furnished the music for the Junior exhibition the day before, furnished the music for this occasion also. Some afternoon games and a supper in the evening brought to a close this festival of the Alumni, which has strengthened the ties that bound the College and its graduates, has brought the graduates of different years together, and renewed the friendships of past times. At the time of issuing the Annual Catalogue for this year, now the twentieth, there was also issued a Triennial Catalogue of officers and graduates. This catalogue has been bound in with the annual catalogue. Among the pleasant occurrences of the year was the celebration by the students of the fourth of July. Besides a parade and salutes, there were the reading of the Declaration of Independence, brief outline of the Constitution, a sketch of the history of the country, and appropriate music, by the students, and on their invitation a history of the College by President Abbot and an oration by Professor Fairchild.

A supper with toasts closed the exercises of the day, all of which, at the request of the students, were presided over by Dr. Kedzie as president of the day.

Rev. Mr. Prudden, Rev. Mr. Wilkins, Rev. Mr. Malvern, of Lansing, and Rev. Mr. Gault, of Ionia, have favored the Christian Union with addresses. Mr. O. M. Barnes of Lansing addressed the Delta Tau Delta Society on London, and the Rev. Mr. Lewis of Jackson gave an address before the Union Literary Society on the Ladder of Oratory.

The interest of students in their studies, and their faithfulness in manual labor have in no year been greater than in this. The College organization for self-government has been more efficient than last year, and all the College, Scientific, and Literary societies have been more than usually flourishing.

The Natural History Society is participated in by members of the Faculty and the students. Its monthly exercises have been highly interesting and profitable. They consist of occasional addresses, and frequent papers on subjects under special examination by professors or students, descriptions of observed phenomena, or objects in natural science, and free discussions. There are four standing committees in the society to lay out its work, viz.: on Botany, Chemistry, Geology, and Zoölogy, but its papers and discussions are not limited to these fields. A few additions have been made to its library and museum.

The Christian Union has had occasional addresses, monthly entertainments consisting of music, readings, essays, and recitations upon previously assigned topics. Its Sunday evening prayer meetings have been well attended, the special subject for contemplation being announced beforehand. The Sunday School under its charge has had five prosperous classes, and their library has been considerably increased. The society held a series of religious meetings at one time this season which were well attended.

There is a society called the Union Literary Society, composed of members of all the classes, excluding none who are willing faithfully to coöperate with

its members in literary and forensic culture; and an Excelsior Lyceum from among the Freshmen. Both meet weekly.

Chapter Iota of the Delta Tau Delta Fraternity has a membership exclusive of those who did not complete the course, or who have withdrawn from the Chapter, of twenty-seven graduates and thirty-three present members of the College. The object aimed at is stated in their report to the President to be "to build up a refined social character, and irreproachable honesty in each member, as well as thorough discipline in writing and speaking."

The Beta Chapter of the Phi Delta Theta Fraternity was organized Nov. 8, 1873, by five members, who, in the language of their report, "felt the need of some society that would strengthen and perpetuate brotherhood and encourage and foster literary and moral culture." It numbers nine graduates and twenty-eight present members of the College.

Students who desired to attend the Centennial International Exhibition at Philadelphia were allowed one week's time additional to the August vacation. Quite a number availed themselves of the privilege.

The Detroit, Lansing and Lake Michigan Railroad, and the Chicago and Lake Huron Railroad, gave free return tickets to our students going to their homes for the two short vacations. The Detroit and Milwaukee did the same to those who entered upon their road at the Owosso station in the August vacation. For such favors hearty thanks are given by the officers of the College, and by the students, many of whom are struggling, unassisted, to acquire an education.

The Faculty forbear in this general Report to give any account of the work done in the various class-rooms, or on the farm or in the gardens, inasmuch as each officer will present a full report of his department. We would, however, call attention to the fact that while the labor which officers have to perform at the College has, within a few years, been largely increased, there has been no corresponding increase of force.

It is but a few years since the Junior and Senior classes were united for instruction in a number of studies. The size of the classes makes this to be no longer practicable. The Freshman class requires to be instructed in two sections, and each division is then larger than it should be.

During the first term, or until our examinations had sifted out the less competent ones, the sections consisted of more than thirty students each. In some branches we have been compelled to divide the Sophomore class also. Before the growth of the College rendered it inadmissible, the Professor of Agriculture gave instruction in Civil Engineering or Physiology, and the Professor of Horticulture in several branches outside of his especial field.

The indispensable labor of correcting themes, and of giving practice in speaking and surveying, as well as in all work where individual instruction or oversight is required, has been largely increased by the growth of numbers in attendance.

For thorough work in instruction and oversight there is need of an increase in the number of officers. Our numbers have always been below the requirements of such a scientific course as we invite students to enter upon.

We are also shut up to one prescribed course of study, while it might be well to give a choice of instruction corresponding to the intended pursuits of students. It may be the intention of some to be more occupied with stock, others with special farm crops, or garden produce, or fruit.

It is, again, with our limited force, difficult to give proper attention to the

graduates of the College who return to it in order to continue some line of study. It is a gratifying proof of the regard in which the College course of study is held, of the interest which has been awakened, and of the increased attention paid to studies hitherto unknown in college courses and neglected, that graduates return, for a longer or shorter period of study, to an extent almost unexampled, except in the oldest and most prosperous colleges of the land.

R. G. BAIRD, *Sec'y.*

T. C. ABBOT, *President.*

STATE AGRICULTURAL COLLEGE, }
Lansing, Mich., Sept. 30, 1876. }

REPORT OF THE DEPARTMENT OF CHEMISTRY.

To the President of the College.

It is with pleasure that I report a successful and prosperous year in the Department of Chemistry. The attendance has been larger than in previous years, and the students have been distinguished for their steady attendance and enthusiastic devotion to their studies and work.

SPRING TERM.

Junior Class.—In the spring term I gave a full course of lectures on Agricultural Chemistry, the lectures being illustrated and enforced by appropriate experiments. The whole number attending these lectures was eighteen.

Sophomore Class.—To the Sophomore Class I gave a full course of lectures on Inorganic Chemistry, illustrated by copious experiments. According to my usual custom, I met the class one evening in each week of the term for a chemical conversation, in which the topics of previous lectures were discussed in a free conversational manner. This is not a required exercise, but almost every student availed himself of this opportunity, and felt it was to his profit to be uniformly present. Some instruction and practice in chemical manipulation was afforded the class, to make them familiar with the simpler details of preparing and performing chemical experiments. It is my earnest desire to extend this course, so as to make all our students skillful in performing all the experiments in practical chemistry; to make them not only theoretical, but practical chemists. The whole number of students attending lectures on Inorganic Chemistry this term was forty-seven.

SUMMER TERM.

Junior Class.—The Junior Class pursued the study of Chemical Physics, completing the study with the exception of Electricity. This was a recitation, but the subject was illustrated by experiments. The total number of students in attendance was nineteen.

Sophomore Class.—To the Sophomore Class I gave a course of lectures on organic chemistry with illustrative experiments. I also gave a short course of lectures on volumetric analysis, followed by a course of analysis by volume, in

which each student was required to make thirty quantitative determinations in alkalimetry and acidimetry.

The assistant in chemistry gave a short course of lectures on blowpipe analysis, and under his charge each student was required to make an analysis of twenty different substances in the dry way.

The class spent two hours a day either in attending lectures or in practical laboratory work. The total number of students in these classes was forty-six.

FALL TERM.

Junior Class.—The Junior Class completed the study of chemical physics, and I am now delivering a course of lectures on meteorology. I have given two evening lectures with illustrations on the subject of electricity. Total number of students in attendance in this class is sixteen.

Sophomore Class.—The Sophomore Class are engaged in qualitative chemical analysis, spending three hours a day in laboratory work, each one making his own investigation into the composition of unknown substances under the direction of the Professor and his assistants. The whole number of students in analysis this term is thirty-eight.

In addition to the regular students in the course, three resident graduates have given their attention to higher chemistry, manipulation, etc. The total number of students that have received instruction in this department during the year is seventy-one.

OUTSIDE WORK.

It is difficult for a teacher in a public institution to confine himself entirely to class-room work. The public claim (and justly) a certain amount of his time and energy. The amount of this outside work should be considered in estimating a teacher's work for the year. The public often pass lightly over what is really one of the most laborious parts of a teacher's work. While this is cheerfully performed by the public-spirited teacher, it is none the less *work*.

Farmers' Institutes.—I need not speak at length of the Farmers' Institutes of 1876, for the history and results of these meetings are already before you in the Report of your Board for 1875. Besides assisting in the organizing of these Institutes, I attended and took part in the Institutes at Allegan, Decatur, Adrian, and Coldwater. I also took part in an extra Institute at Ypsilanti. At the request of this Board I have prepared and had printed a circular in regard to the Institutes of 1877, and have sent copies of this circular to each member of the Board.

American Medical Association.—Having been appointed Chairman of the Section of State Medicine and Public Hygiene in the American Medical Association, I attended the meeting of that body in June at Philadelphia, and presided at the meetings of the Section named. In preparing the work for that Section much labor in the way of correspondence and circulars was involved, but as the results of such work are for the benefit of the whole mass of the people, I felt justified in devoting a part of my time to this work. As Chairman of the Section, I gave a public address before the Association on The Two Great Natural Purifiers, viz.: Air and Water. In the Section I read an extended report on The Water Supply of Michigan.

State Board of Health.—As member of the State Board of Health, I have attended all its meetings except the one in January, from which I was absent on account of the Farmers' Institutes, which occurred at the same time. I

have prepared three articles for the annual Report of that Board: 1. Means of Escape from Public Buildings in case of Fire; 2. Ventilation of Railroad Cars; 3. The Water Supply of Michigan. As the efforts of the State Board of Health are directed to promoting the public health, I think an intelligent public will justify me in devoting a part of my time to this beneficent work.

Detroit Medical College.—By invitation of the Faculty of Detroit Medical College, I gave an address to their graduating class at their commencement in February last.

Lightning Rods.—During the year I have spent a good deal of time in experiments to determine the laws of conduction of electricity in metallic rods to ascertain beyond controversy whether conduction is by surface action or through the mass of the conductor,—whether a solid rod is as good a conductor as a tube of the same metal. It may be said that this is a question of purely scientific interest, and of no practical importance to the farmers, but I think it is of pecuniary interest to the farmers to have this question settled correctly, aside from the question of safety to life and property. The cost of an iron tube will be at least double that of a solid rod containing the same amount of metal, and the use of solid rods would thus reduce one-half the cost of a rod as compared with the use of iron tubes of equal conducting capacity. It will thus be evident that such investigations are of value to the public, aside from the scientific question involved. It is money in the pocket for people to know the truth.

Meteorological Observations.—A full set of meteorological observations have been taken for the year, and monthly reports of the same forwarded to the Smithsonian Institution. These observations have now been taken continuously for more than 13 years at this College. I believe they are the only set of complete observations ever taken in this State, embracing the same number of years. They will be of great value in determining many questions of great importance to the farmers of this State.

WANTS OF THE CHEMICAL DEPARTMENT.

We need additional means for class illustration, especially a projection spectroscope and an electrical lamp. For these and other needed apparatus I ask an appropriation of \$500 for each of the years 1877 and 1878. We also need some cheaper and more convenient means of heat for use of students in analysis. With the present revenue tax on alcohol, it is very expensive as well as inconvenient material for such use. The introduction of a cheap gas machine would afford a convenient and much more economical source of heat. I therefore ask for an appropriation of \$750 (all to be expended in 1877), for a gas machine and fixtures for the Laboratory.

ASSISTANT IN CHEMISTRY.

On this topic I cannot do better than to substantially repeat what I said in my last report. I cannot in justice pass from the subject of Laboratory work without speaking of the satisfactory way in which my assistant has performed his laborious duties. Besides the janitor work for the laboratory, such as sweeping the rooms, building fires, etc., work done in other departments by a student specially assigned to that duty, he assists in preparing chemicals and apparatus for class-room illustration. He takes all the meteorological observations. When I am called away from the College by other duties he gives my lectures and carries on my classes to their entire satisfaction. He takes almost the entire care of the routine work in chemical analysis. But for having so capable an assist-

ant I should be able to do but little beside class-room work, and all opportunity for original investigation and outside work would be impossible. While he has discharged these difficult duties to my entire satisfaction, his salary is less than that of any employé of the College that fills a position of like responsibility. While other employés receive \$600, with board, washing, and other personal expenses, he only receives \$600, with no cost for personal expenses—which cannot be less than \$4 per week. He thus receives a salary of \$400 as compared with other employés in positions of corresponding responsibility. I ask that this disparity be removed by making his salary \$800 without perquisites.

All of which is respectfully submitted.

R. C. KEDZIE,

Professor of Chemistry, and Curator of Chem. Laboratory.

STATE AGRICULTURAL COLLEGE, }
 Sept. 30th, 1876. }

REPORT OF PROFESSOR OF ENGLISH LITERATURE.

To the President of the College :

The following is a report of various duties performed in my department since my last report of November 30th, 1875:

The new arrangement of studies entered upon at the beginning of this year has somewhat increased the number of classes naturally falling to my charge, and the work has been fully as confining as ever. A brief summary of class work may be given here :

The Senior and Junior classes were united for the study of French, giving me a class of 34 members,—too large to handle to the best advantage. The course consisted of 25 weeks, 13 upon the grammar, with daily written themes, and 12 upon the reader, with attendant grammar lessons. Nearly the whole of Otto's grammar was thus studied, and some 80 pages of Böcher's Otto's Reader was translated. All save one passed successfully the examinations closing the terms, May 23d and August 18th. Some 1,400 themes were corrected.

The Senior Class took the usual course of twenty-five lectures in Political Economy. My effort has been to make the presentation of this science as complete as possible in so brief a course by careful analysis of related topics and presentation of these relations to the eye by a chart. Especial attention is also given to illustration of principles by familiar facts, and to discussion of such applications as particularly concern agriculture. The class numbered eighteen, all of whom passed a satisfactory examination after having shown much interest during the progress of the study. The wish was often expressed that the course could be extended.

The Sophomore Class took the same course in Hepburn's Manual of Rhetoric as that pursued last year, with the usual success. The book is scarcely satisfactory, and I have recommended a return to Whately's Rhetoric in the new course, which gives place for rhetoric in the Junior year. The class this year

was a very large one, numbering forty-seven, in which much energy was needed to keep up the interest. The success was on the whole gratifying as marked by general proficiency and interest in rhetorical exercises. Five members of the class left during the term from sickness or other disability, and four failed upon final examination; one of these, however, has since passed satisfactorily.

The new course of study has introduced into the Freshman year one course of thirteen weeks in English composition instead of several shorter courses in different years. The advantage of this seems to be settled by this year's experience, in which it has been found far easier to interest the class and gain a real progress than heretofore. The method adopted was as follows: Hart's Composition and Rhetoric was taken as a text book, especially for its numerous examples, and lessons from it embraced, first, prose composition in its various forms; then, punctuation, diction, and sentences, in order, with a brief explanation of figures of speech from an analysis of my own. Every week during the course each member of the class was required to prepare a written exercise for my inspection, with especial reference to accuracy and neatness of execution, as well as to arrangement and expression of thoughts. The topics assigned may give an idea of the scope of instruction: 1, a business letter; 2, a letter of friendship, giving a day's experience; 3, the journey to college, by analysis; 4, biography of Socrates or of Washington; 5, story of growth in some plant; 6, description of some prominent building, in the order of progress while visiting it; 7, description of the oak or the pine, as a lumberman views it, or a forester, or a botanist; 8, description of some animal; 9, explanation of some trade, business, or profession; 10, narrative of causes producing an effect, as a war or a loaf of bread; 11, description of a complex machine, or of a landscape. Special instructions preceded the preparation of such exercises, and all were subjected to close criticism; some were read before the class and noticed there. The whole number of exercises thus handled was about 800. The class of seventy was heard in two divisions for the sake of thorough work, and sixty-two completed the study satisfactorily. Four left College before the close of the term; four failed in examination; one of the latter, however, was able to pass after some weeks of private study.

I have now in charge a class of 12 Juniors in English Literature. The class provide themselves with Chambers' Cyclopedia of English Literature, for constant reference and frequent use in class-room, but the course is given by daily lectures, covering the history of the language, the peculiar influences in the growth of literature in different periods, and biographical sketches of leading authors, from Chaucer down, with especial attention to the development of their genius. While this course may be less defined than an ordinary text-book would make it, the interest awakened is indefinitely greater, so that several of the Seniors have been constant attendants upon the lectures this year, as a voluntary exercise.

In this connection may be mentioned a voluntary class in Shakespeare, designed for the Juniors. It is held for an hour on each Thursday evening, and has been well attended, the average number being as high as 15, I judge. One play, "As you like it," has been completed, and another, "Hamlet," is begun.

The Freshman class, numbering 46, has begun the study of French in Otto's Grammar. The class recites in two divisions, that all may recite daily, and occasional written themes are required. The excessive burden of so many written exercises to correct, has led to the devising of other methods for drill, and especial effort has been given so far to interest the class in comparison of French

and English words and idioms, for the better understanding of our own tongue. The French has thus been made conducive to the study of English grammar. At the earnest request of 25 or 30 of this class, I have consented to meet them one hour a week for English parsing and analysis. The expectation of teaching during the winter, entertained by many of the students, gives especial zest to this study.

No small portion of my year's work is found in oversight of the rhetorical exercises of the Junior and Senior classes. There have been prepared under my direction and delivered in the College chapel 103 orations, 17 of which were presented at the Junior exhibition. The methods of instruction have been essentially the same as those given in the report of 1875. These exercises have given me occupation with students at least five hours weekly, and fully twice as many hours in the study. There are now in course of preparation 25 orations to complete the work of the college year.

Other duties at College have been the oversight of the Library,—elsewhere reported upon,—a lecture in the regular order of Wednesday exercises, a Bible-class under charge of the College Christian Union, and the usual committee work. A relief in this last particular, however, has been felt by the appointment of a standing committee upon general arrangements for public exercises.

My share in three of the Farmers' Institutes of January last has already appeared in the published report. Of other work outside of College routine I have done very little, thinking my strength to be needed in everyday duties. The work of Township Superintendent of Schools during the winter, amounting to some five days' time, and a brief oration at the College on Independence-day, comprise it all. My absence from daily duties is all included in seven days taken for a visit to the Centennial Exposition, during which the President kindly undertook to provide for my classes.

In conclusion I have only to deprecate the fact that my labor must be so scattered in many directions as not to give the best results in teaching, and to leave no time for studies that I need for my lectures, and that may bring advantage to the College. I feel that I ought not to ignore this need of my department. If any thought arises that some of the drill in composition might be dispensed with, since the College is especially designed to give instruction in sciences related to agriculture, it must be thought too that "he who knows but cannot clearly show it, is as if he had not learned." The influence that our students and graduates have throughout the State must depend as well upon their ability to express well the facts of their knowledge as upon their having them. If the French could be provided for by additional instruction from some source, my efficiency as professor of English Literature would be increased to the benefit of the College in many ways.

Respectfully submitted.

GEO. T. FAIRCHILD.

STATE AGRICULTURAL COLLEGE, }
Lansing, Mich., Sept. 30, 1876. {

REPORT OF LIBRARIAN.

To the President of the College:

DEAR SIR:—The following report of the College Library for the ten months passed, since my last annual report, is respectfully submitted:

The Library has been open daily during term time, at the usual hours. It has also been opened for an hour after supper, each day of the short vacations. During the long winter vacation no provision was made for opening, the members of the Faculty having access by means of keys in their possession.

The care of the room has been, as usual, in charge of a student. Three different members of the Freshman class have had this duty, and have given good satisfaction. No work outside this regular routine has been undertaken for want of time on my part, for the necessary oversight. The catalogue of subjects is still needed, but must wait until more skilled assistance can be had in making it. The pamphlets are as yet but partially arranged and without convenient catalogue. The Institute pamphlet cases, for which a small sum was appropriated in April, were not to be found in the market, and I have not discovered as yet any other that seemed to promise satisfaction. This work I hope to accomplish another year.

The record of books drawn, which does not include the large number consulted in the library by the daily visitors, shows the number of persons who have drawn books to be 161, and the whole number of books drawn to be 1,298. Of these 336 were upon purely scientific subjects, 185 upon agriculture and horticulture, and the remainder in history, biography, and miscellaneous literature. To the last class of books the Christian Union Library of about 200 volumes is an excellent supplement. This has been extensively used, but I have no data from which to report. It is deposited permanently with the College Library, and is under the same rules, but has its own officers and a separate record.

The library has been considerably increased during the present year, both by purchase and by donations. The number of volumes added by purchase (including such periodicals as when bound make a most useful part of the library) is 181. The number added by donations, and exchanges through the Secretary, is 147, of which about one-third are pamphlets of a permanent interest. The increase in numbers, 328 volumes, does not, however, indicate the extent of the growth; for the nature of the addition is its best recommendation. All purchases have been at the suggestion of the professors in the different departments. Catalogues of books, implements, seeds, etc., for sale, and premium lists of fairs, or advertising pamphlets of any kind, have not been included in the above, though several hundred of these have accumulated. All the above donations have been reported to the Faculty from time to time for record in the general list of donations.

The College has taken for the Library, upon subscription, twenty-seven periodicals, as follows:

The Country Gentleman.

The American Agriculturist.

The Agricultural Gazette.

The Gardener's Chronicle.

The American Chemist.
The Chemical News.
The Journal of the Chemical Society.
The American Journal of Science and Art.
The Popular Science Review.
The Quarterly Journal of Science.
Nature.

The Naturalist.
The Electric Engineering Magazine.
Engineering.

The American Bee Journal.
The Canadian Entomologist.
The Atlantic Monthly.
Harper's Monthly Magazine.
The Nation.

The North American Review.
The International Review.
Blackwood's Magazine.
The British Quarterly Review.
The London Quarterly Review.
The Edinburgh Review.
The Westminster Review.
The Detroit Daily Tribune.

The following periodicals, to the number of fifty-six, have been furnished by the publishers.

The Canada Farmer.
The New England Farmer.
The Prairie Farmer.
The Michigan Farmer.
The Practical Farmer.
The Western Agriculturist.
The Western Rural.
The American Rural Home.
The Scientific Farmer.
The Boston Journal of Chemistry.
The Bee Keepers' Magazine.
Gleanings in Bee-Culture.
The Michigan Teacher.
The Peninsular Journal of Medicine.
The Detroit Review of Medicine.
The Church Union.

The American Missionary.
The Galaxy.

The Penn Monthly.

The Christian Register, }
The Religious Magazine, } Through the A. U. S.

Browne's Photographic Monthly.

The Essex Institute Bulletin,

The Patent Office Gazette.

The Monthly Report of Department of Agriculture, U. S.

The Advent Review.

The Health Reformer.

The Communist.

The Foot-hill Weekly Tidings.

(The last four have been furnished for a part of the year.)

MICHIGAN NEWSPAPERS.

Allegan Journal, semi-weekly.

Ann Arbor Michigan Argus.

Battle Creek Journal.

Charlotte Republican.

Clinton County Republican.

Coldwater Republican, semi-weekly.

Grand Haven Herald.

Grand Rapids Saturday Evening Post.

Grand Rapids Times.

Grand Traverse Herald.

Hastings Republican Banner.

Hillsdale Standard.

Ingham County News.

Jackson Citizen, weekly.

Lansing Journal.

Lansing Republican, semi-weekly.

Midland Independent.

Monroe Commercial.

Newaygo Tribune.

Pontiac Bill Poster.

Romeo Observer.

Sanilac Jeffersonian.

Sturgis Journal-Times.

Traverse Bay Eagle.

Wolverine Citizen (Flint).

Ypsilanti Commercial.

We have had also occasional numbers of other papers, as of particular interest.

Members of the Faculty have added to all this variety by their donations as follows:

President Abbot has given The Weekly Scotsman, The Independent, The New York Evening Post, semi-weekly, The School, and the Grange Visitor.

Prof. Beal has furnished The Ann Arbor Courier, The New York Tribune, weekly, The Ohio Farmer, and The Indiana Farmer.

Mr. Carpenter has given The Detroit Free Press, tri-weekly, and the School Bulletin.

Mr. Garfield has given, nearly complete, The Rural New Yorker, and The Western Farm Journal, and the Kentucky Live Stock Journal.

The Librarian has added The Advance, The American Citizen, The Literary World, and The Oberlin Review,

The interest in the reading-room is constantly on the increase, the magazines and local newspapers seeming most attractive. I hope we may be able to keep the supply of current literature as good as it is now.

The convenience of the Library has been increased by the addition of a table and two step-ladders, while the general appearance has been improved (aside from the increase in books and better binding), by a couple of photographs

of the Iowa Agricultural College, a gift from Prof. C. E. Bessey, class of '69, and by deposits of the National History Society. Increased shelf-room will be needed another year, according to the general plan already adopted, when the Natural History Society should have a place, if possible, in the General Museum.

Expenditures connected with the Library, for which vouchers have been rendered to the Secretary are classified as follows:

For books for the Library (bound).....	\$379 99
periodicals, etc. (to be bound).....	179 97
binding, 68 vols. @ \$1.12½.....	76 50
repairing 2 vols.....	50
freight and express charges.....	18 30
postage and exchange.....	2 87
furniture.....	13 15
stationery.....	66
books sold to professors and students.....	83 33
Add to these cash items, students' labor.....	63 30

Receipts passing through the hands of the Librarian are from sales of a residue of old text books, of the text books in Analytical Chemistry, of which 300 copies have been deposited with the Librarian, and of books purchased from time to time for convenience of the professors and students, such as the hymn books used in the College chapel, etc. These receipts have been turned over to the Secretary frequently, and are classified as follows:

From old text books.....	\$8 10
Chemistries.....	38 00
other books.....	80 24

There remain on hand hymn books worth \$3.80, which sum added to the \$80.24 gives \$84.04 received for what cost the College \$83.33, and a trifling expense to cover the balance of 71 cents.

The account of the Library will be found in summary among the department accounts.

The balance of the appropriation of \$1,000, from the State Treasury for the two years ending December 31st next, will be wholly expended, unless some few foreign books should fail to reach us as expected.

I omit any estimate of needed expenditures for ensuing years, as I have already placed in your hands such a paper for presentation before the State Board of Agriculture.

I cannot but add in closing the hope that some way may be found to give to the Library more of somebody's time and strength in oversight. Such as I have given has been but the recreation after hurrying through the crowded duties of my professorship. The Librarian ought to know the whereabouts and general contents of the books in the Library, as well as to keep up full correspondence with various sources of increase; but I have had no time and little thought for either.

Respectfully submitted,

GEO. T. FAIRCHILD.

STATE AGRICULTURAL COLLEGE, }
Lansing, Mich., Sept. 30, 1876. }

REPORT OF THE PROFESSOR OF ZOOLOGY AND ENTOMOLOGY.

To the President of the College:

Herewith I present a report, of the instruction given, and the progress made in my department for that portion of the past College year which has expired.

Early in the year, my assumed labors more than equaled my strength, so that for more than two months I was nearly disabled from College duties, having lost the use of my voice. During this time I was fortunately able to procure very efficient aid, so that the course of instruction was not broken in upon. I was able most of the time to carry on my other duties, some of the time, however, in an indifferent manner. I also took advantage of my misfortune by taking this time to visit the great Exposition at Philadelphia, and some of the leading museums of the country.

Owing to a change in the arrangement of the College terms, my instruction has been such as to make the title of my professorship almost a misnomer, the majority of the subjects taught not coming in my department at all. I feel that in view of the increasing duties of my position as Apiarist, and Curator of the Museum, and the disadvantage I labor under in giving instruction in so many subjects entirely foreign to my general thought and study,—Rhetoricals, Book-keeping, History and Mathematics—that some provision for a change is very desirable.

The Junior class had a course of thirteen weeks in Mechanics. The study was pursued by use of text-book—Snell's Olmstead. The class made very commendable progress, the members, without exception, evincing an interest which bore fruit in an excellent scholarship, and most satisfactory examination. The class average was unusually high. The same progress was shown in the study of Hydrostatics, Acoustics, and Optics, during the first half of the second term. The class numbered thirteen.

I can not close this part of my report without reference to the excellent manner in which the class was conducted by Prof. Carpenter during my sickness.

The Junior class also had a course of eight weeks in Entomology, during which time a course of lectures was given embracing the following subjects: The Anatomy, and Physiology of Insects, their Classifications; Scientific and Practical Apiculture, and Economic Entomology. In the pursuit of the last two subjects we were aided very much by the use of my Manual of Apiculture, and my pamphlet on the Injurious Insects of Michigan.

The members of the class collected and bred insects, that they might the better observe their transformations, and also performed more laboratory work than usual. They dissected, to determine accurately the anatomy of insects. They not only examined under the microscope those portions used in classification, but also dissected out and carefully examined the digestive, circulatory, respiratory, nervous, and reproductory organs. The results of their laboratory work were shown by figures carefully drawn on the black-board and explained to the class.

During the instruction in Apiculture, the students witnessed all the manipulations, such as forming nuclei, dividing colonies, introducing queens, extracting, etc., and such as desired—nearly all—actually took part in the operations

Owing to the change of terms our time in Entomology was cut short four weeks, but the excellent attention and diligence of the students went far to make this up.

The class numbered fifteen.

I also had the Juniors four weeks in comparative anatomy, in which time the subject of Osteology was pretty well considered. We received invaluable aid from the skull and skeleton, which have been recently added to our collection. The class numbered twelve.

The Freshman class pursued the subject of Ancient History for the first term. The history of Greece and Rome, as also that of the Middle Ages, was studied from the text-book, use being made of Swinton's Outlines, which seems admirably adapted to our purpose. I also gave them lectures, covering the still more ancient history of the most important nations; as the history of Egypt, Persia, Assyria, etc. Attendance on these lectures was voluntary, and they were given outside of study hours, yet they were attended by nearly all, and the interest and attention given to the lectures, as well as to class instruction, was most satisfactory. The class was so large that it had to be divided, yet even then there were nearly forty in each division, and, notwithstanding the large number, the deportment was perfect, and the progress made very encouraging.

At the present time the Sophomore class is studying mechanics, under my instruction, using the same text book as did the Juniors earlier in the year. The class numbers over forty, yet for interest and attention and real progress I never had a class do better. This study will continue for the remainder of the College year.

During the year I have had charge of the large Sophomore Class, numbering forty-six members, in rhetoricals. For the first two terms each student was prepared once in three weeks with either a declamation or an essay, the one alternating with the other. Since the commencement of the last term orations have been substituted for the essays and declamations. The charge of this immense class has been a severe task, yet I have been encouraged by seeing a good degree of progress. So far as the students are concerned there is every reason to be satisfied.

For the first two terms of the year, Mr. J. Wheeler Higbee, of the class of '74, gave special study to the subject of zoölogy and apiculture, under my direction. Mr. Higbee studied the natural objects, and worked with real enthusiasm till failing health obliged him to cease his studies. His study of apiculture was supplemented by actual work, as he did a large share of the manual labor of the apiary.

Before closing this report I wish to express my great joy at the good deportment, great diligence, and gratifying earnestness which have been very noticeable in all my classes during the year. So far as my experience goes, it has been a marked year in the history of the College.

NEEDS.

Before next year we very much need some more microscopic preparations in physiology. As yet we have no preparations of nerve tissue. I would advise the outlay of at least ten dollars (\$10) for such slides. We also need at least three—and five would be better—of Tolls' hand lenses for use in dissection in entomology. These are so very necessary that I feel that we must have them.

OUTSIDE WORK.

During the winter besides preparing two lectures for the Institutes—one of which was delivered at three different places,—I also gave one lecture before the annual meeting of the State Pomological Society, and wrote out and illustrated a Manual of the Apiary, which if we may judge from the call for it, was opportune in its time of appearance. These are sold at the price of thirty cents, and already there have been over six hundred called for. I have also been called upon, as one of the Executive Board of the State Pomological Society, to work not a little for that Society. During the winter I was sent to Detroit for a week to confer with the Executive Committee of the State Agricultural Society in reference to exhibiting at the Centennial, and the advisability of a Union Fair in the succeeding autumn. I was also made a committee on getting electrotypes for the Report of the Society for 1875, and have been chairman of the Finance Committee of that Society for the year. The entire arrangement of the fruit display at the State Union Fair at Jackson was under my charge, and with the admirable assistance of two of our graduates, Messrs. C. W. Garfield, and H. G. Reynolds, and the wife of the former, I made a classification of the fruit, which was not only very instructive but absolutely imperative, if anything like justice is to be done by awarding committees when such large exhibitions are made. I sent out over three hundred communications before the Fair, calling the attention of fruit men to the exhibition and the desirability of making it a success.

During the year I have been secretary of the Alumni Association, and performed the correspondence necessary to the triennial meeting held at the College the 23d of August. I also had charge of the triennial catalogue of the officers and graduates of the College, which was published with the general catalogue of the College.

Early in the season, before my sickness, I had charge of a large Bible-class, was also Junior Counselor in the Christian Union, and Chairman of the committee on Sabbath Evening Lectures.

I had designed some experiments in Scientific and Practical Entomology, but owing to my poor health, was obliged to give them up. The fields in this direction are white for the harvest. The only thing required is time and opportunity.

Respectfully submitted.

A. J. COOK.

STATE AGRICULTURAL COLLEGE, }
Lansing, Mich., Sept. 30, 1876. }

REPORT OF THE CURATOR OF THE GENERAL MUSEUM.

To the President of the College:

The following is my report as Curator of the General Museum:

The collections have been augmented considerably by donations, the principal of which are several Indian relics by students and others, and a large collection of insects from myself.

The donations have been properly labelled, and recorded in the Museum Register.

During the year there has been purchased by me, under authority of the State Board, a fine human skeleton with the parts all articulated, or held in place by wires; also a skull, so arranged that it may be taken apart or disarticulated, so that the parts usually concealed, as the internal ear and turbinated bones, may be plainly seen and easily studied. I was so fortunate as to get these not only at a large discount, but also to receive as a gratuity two plaster models, one of the brain so made as to illustrate all the parts; the other of the mouth, pharynx, larynx, etc. These not only form a considerable attraction in the museum where they are on exhibition, but also form a much needed aid in giving instruction in anatomy.

At the beginning of the year the space at my disposal was insufficient for the specimens. To remedy this I extended one of the cases to the ceiling. I also secured Yale locks for all the cases.

I have also had stands made for such of the birds and mammals as were not properly mounted.

Much more might be profitably done to increase and improve the collections, which the extent of my duties,—teaching several classes outside of my department, a large correspondence upon entomological subjects, and the entire charge of the apiary,—renders at present impossible.

The subject of room is one that should receive early attention. Even for the coming year it will be necessary either to extend the other side cases to the ceiling, which is unsatisfactory, as it makes the specimens show at a great disadvantage on account of distance, or to build new glass cases within the room, at some distance from the sides.

The question, too, of room beyond the limits of the present apartment is one that must soon call for attention.

The needs of the museum for the coming two years will demand an outlay of at least five hundred dollars for each year:

For care, alcohol, stands.....	\$100 00
For extension of cases.....	100 00
For completing suites of specimens,—zoölogical, paleontological, and anatomical.....	300 00
Total.....	<u>\$500 00</u>

A suite of Ward's casts would also form a very interesting and instructive addition to the museum, and would be of paramount value in giving instruction in geology. These would cost one thousand dollars, and should be procured as soon as practicable.

The following is an account of the expense incurred in the care, management, and improvements for the past year :

Yale locks.....	\$23 87
Extension of cases.....	20 00
Students' labor (care and stands).....	14 59
Adjusting locks.....	6 00
Anatomical specimens.....	93 00
Express on anatomical specimens.....	4 30
Express on locks.....	65
Chemicals, paint, etc.....	3 80
Catches for locks.....	1 00
Total expense.....	<u>\$167 21</u>

The above does not include the expense for alcohol, which bill has not been presented.

Respectfully submitted.

A. J. COOK.

STATE AGRICULTURAL COLLEGE, }
Lansing, Mich., Sept. 30, 1876. }

REPORT OF THE APIARY.

To the President of the College:

Of the ten colonies of bees placed in the new cellar November 26th, all but one—the experimental colony, with none but old bees—came through the winter in fine condition. That one lived till spring, and then died. These colonies were all removed from the cellar once in January, and once in March, that they might have a purifying flight. They were not removed to the summer stands permanently till the middle of April.

During the previous autumn the bees were kept breeding even into October, and consumed nearly all the pollen. Several colonies had none. These had no brood when removed from the cellar. I attempted to supply this lack by feeding meal during the last of April, but found that nearly as soon as the weather would permit the bees to fly they could get pollen, and thus would not touch the meal.

I fed sparingly of syrup till the fruit trees were in bloom, and by that time had six or seven frames of brood in each hive. I also fed a little between the fruit trees bloom and that of white clover, with the most satisfactory results.

During the season I have increased from nine to twenty colonies, all large and in excellent condition. I also procured two Italian queens imported from Italy, but lost one in introducing. The other has done well, and from her I have Italianized the whole apiary, though I am in doubt whether all the queens were purely mated.

I did not permit the colonies to swarm, but practiced artificial swarming, or dividing. I lost three colonies, one coming out in the spring, and leaving at once, without waiting to alight even; the other two going off this fall, before I suspected any such thing, choosing Sunday as the time for their leave-taking. Had I previously cropped the queen's wings, all of these would have been saved. I have now no queens with uncropped wings.

I have extracted during the season 507 pounds from the brood chamber. About a third of this was from basswood, the other two-thirds from fall bloom, and none was extracted except from worker-comb, which it was desired to keep free from honey that it might be used for brood.

During the season I have worked for comb-honey, both in boxes and in small frames, and found that I could secure much more in the frames. I find, too, that the honey in small frames is liked quite as well by consumers.

In the spring I surrounded the apiary grounds with numerous honey-producing shrubs and trees, as basswoods, locusts, crab-apple, shad-bush, etc. Most of these have done well,—a few have died. These have been kept mulched, and the ground about them well spaded all the season. I have also set out more evergreens, some for a wind-break, others for shade for bees; and have started some Concord grape-vines and Virginia creepers for shade. Some of the latter plants have been set about the house, that it may climb upon it, and has already made a fine growth. I have also set out several kinds of bee-plants of more or less repute. The following kinds have done well, and all have yielded bloom except the two first, which will not bloom till another season: yellow trefoil clover, yellow Bokhara clover, mignonette, black mustard, Chinese mustard, borage, common and silver-leaf buckwheat, common and Chinese sunflower, and Rocky mountain bee-plant.

The following is the account with the apiary:

APIARY.		Dr.
To tools.....		\$12 00
seeds.....		2 25
record book.....		1 60
45 lbs. sugar.....		4 95
lumber for hives.....		16 87
“ “ work-bench.....		2 00
drawing lumber.....		1 00
nails, brads, tacks, tins, and hooks (for hives).....		7 75
paint and oil (for hives).....		3 98
students' labor (making hives).....		18 23
“ “ (making work-bench).....		3 00
Italian queens.....		19 60
3 bee hats.....		1 55
2 doz. registering cards.....		30
1 oz. pep. essence.....		50
4 lbs. comb foundation.....		3 50
2½ lbs. beeswax.....		75
students' labor in care of bees.....		7 68
24 evergreens.....		3 00
students' labor in care of experimental plats.....		15 35
broken rake.....		50
3 cart loads manure to mulch trees (for garden) @ 40c.....		1 20
11½ wagon-loads manure for experimental plats (for farm) @ 25c.....		2 88

To garden team (plowing for trees).....	\$1 00
“ “ (“ “ experimental plats).....	1 70
students' labor in setting and caring for trees.....	18 22
2 loads saw dust (improving ground).....	2 75
3 $\frac{1}{4}$ hours' team work (drawing manure).....	97
Total amount.....	<u>\$155 08</u>

RESULTS CLASSIFIED.

Improvement of grounds.....	\$26 17
Experimental plats (Honey Plants).....	23 65
Tools, record-book, etc.....	20 45
Hives, feed, queens, and care of bees.....	84 81
Total amount.....	<u>\$155 08</u>

APIARY.

	Cr.
By 11 colonies bees (in hives) @ \$10.00.....	\$110 00
59 lbs. extracted honey @ 17 $\frac{1}{2}$ c.....	10 32
115 “ “ “ @ 20c.....	23 00
389 $\frac{1}{2}$ “ “ “ @ 15c.....	58 42
64 $\frac{1}{2}$ “ comb “ @ 20c.....	12 90
84 “ “ “ @ 25c.....	21 00
168 “ “ “ @ 20c, (unsold).....	33 60
70 “ asparagus @ 08c.....	5 60
60 frames worker comb @ 10c.....	6 00
9 bee hives @ \$2.00.....	18 00
improved grounds.....	26 17
experiments on bee-plants.....	23 65
tools, record-book, etc.....	15 45
work bench.....	5 00
lumber, paint and oil on hand.....	2 33
Total receipts.....	<u>\$371 44</u>
Total expenditures.....	<u>155 08</u>
Net profits on 9 colonies.....	\$216 36
Net profit per colony.....	<u>24 04</u>

CONCLUSIONS FROM YEAR'S WORK.

The experimental hive, strong in old bees, but which contained no young bees, as no brood was permitted to hatch after the middle of August, and which died in early spring, indicates that spring dwindling may come from the fact that there are no young bees in the hive when the bees go into winter quarters. This condition may arise either from a poor queen, a poor honey yield, or dearth of honey in autumn, when even the best queen will refuse to do duty; or, as has been the case here this fall, such a great honey yield as to give the queen no opportunity.

NATURAL SWARMING.

I have proved, what reason and a knowledge of the natural history of the honey-bee would discover, that natural swarming is always suffered at a great

sacrifice. This insures a queenless colony for nearly or quite two weeks, which is equivalent to the loss of a fair colony of bees, as a good fertile young queen will start a fair colony in this time, especially as this is generally at the time of the best honey season of all the year.

THE EXTRACTOR.

The great value of this machine has been again demonstrated during the wondrous honey yield of August and September. Although the bees had plenty of room in the supers—both boxes and frames—still they would fill up the brood space as fast as the bees came forth, so as utterly to preclude breeding. By extracting I kept the brood chamber replete with brood, while by omitting the same, breeding stopped entirely. I found, too, that this sent the queen into the supers, where she would lay if there was a possible chance; whereas she remained below entirely when room was given her in the brood-chamber.

POLLEN A REQUISITE TO BROOD REARING.

The fact that there was no brood reared in colonies destitute of pollen till the bees had gathered and stored some, seems a positive demonstration that pollen is an essential element of the food of the larvæ, though it is not required by the mature bees. The rapid increase of brood in the spring would also indicate that it is as well, if not best, that the bees have no pollen till they can fly out in spring.

FEEDING MEAL.

The observations the past spring, sustained also by those of 1874, show that bees are pretty apt to be able to gather pollen as soon as it is best for them to fly in the spring,—by the middle of April,—and that feeding meal is unnecessary.

EVERGREENS FOR SHADE.

Evergreens for shading the colonies, especially Norway spruce, not only serve an excellent purpose, but can be trimmed so as to make the apiary grounds very attractive from their beauty, and are to be strongly recommended.

SAWDUST ABOUT THE HIVES.

The sawdust about the hives, underlaid with brick, by keeping the grass down, serves an excellent purpose, as it enables one to see at once any bees that fall upon it, and thus ensures against loss of queen.

LATE FALL FEEDING.

As all the bees wintered so well during the past winter, I could see no special difference between those fed late the previous fall and those that were not. All bred so late as to vitiate the experiment.

HONEY-PLANTS.

The experience of the summer shows that the following honey-plants not only yield well, but that they bloom from early in July till autumn, covering a period when there is a dearth of native honey bloom: mignonette, borage, and black mustard. Chinese mustard is inferior to black mustard. It blooms earlier, and the bloom fades away much sooner. Sun-flowers are unworthy cultivation, while the Rocky Mountain bee-plant blooms too late to be valuable where there is plenty of fall bloom native to the region. With no native bloom to furnish autumn honey, it would be valuable. All of the above do well on light sandy soil.

GOLDEN-ROD HONEY.

Our autumn experience proves that golden-rod honey, though rather dark, is of very superior flavor. Several good judges have pronounced it superior even to linn or white clover.

A. J. COOK.

STATE AGRICULTURAL COLLEGE, }
Lansing, Sept. 30, 1876. }

 REPORT OF THE PROFESSOR OF BOTANY AND HORTICULTURE.

AGRICULTURAL COLLEGE, Sept. 30, 1876.

To the President of the State Agricultural College:

I present the following report of my department for the year 1876:

HORTICULTURE.

Instruction in this department began on the opening of the first term, the 24th of February. The Sophomores and a few others, 49 in all, devoted eight weeks to the subject of horticulture.

The course pursued and the topics considered were much like those of the previous year, with some additions. Most of the instruction was given by lectures, though considerable use was made of "The American Fruit Culturist," the excellent work of J. J. Thomas.

STUDENTS' LABOR.

As heretofore, the work has nearly all been done by students. This brings out a large number of hands for only three hours a day, and requires considerable planning to use them all to best advantage. The difficulty is much increased by our small amount of team work. The cart-horse, "Old Prof.," now about twenty-five years old, has been nearly worthless for most of the past year. For lack of team work students have too often been obliged to work at great disadvantage, using wheel-barrows instead of a cart to remove rubbish and some other materials. to use hand-hoes instead of cultivating with a horse.

The enlargement of the garden has made it necessary for our single team to keep busy drawing manure from town and muck from the marsh, to mow the lawns, plow and cultivate the gardens and apple orchard. We have even been obliged to hire some team work to accomplish this.

According to custom for some years, the juniors have all worked in the horticultural department for the whole year. Instead of having a third of the seniors for four weeks and then change them for another third, and so keep changing them every four weeks, we have had one-half of them for the entire year. By this means we have been able to give each of them some special kind of work to look after during the whole year. As far as possible each senior had his choice in the work of which he had charge. This not only made it easier for the foreman and myself, but the students were much more interested because

intrusted. I am much pleased with this plan and have no desire to return to the old way. One senior had charge of the grapes, one the other small fruits, one the nursery and forestry, one the drives and paths, one the apple orchard, one the experimental grasses, another the repairs about the buildings. In these separate departments each senior either did all the work from time to time, or more often he acted as foreman of other students who helped him in the work.

The juniors have all had quite a variety of work. Each has had a chance to work a few weeks in the greenhouse and flower borders. All of them have had an opportunity, with varied success, to oversee a number of other students in different kinds of work. Most of them like to be thus placed in responsible positions, and usually do their best to perform their work well and with considerable dispatch.

We have had one-third of the freshmen for each of the three terms, instead of changing oftener, as in former years. The new plan has proved perfectly satisfactory to all concerned.

PROGRAMMES FOR WORK.

I insert from the work-book what all the students in the horticultural department were doing on three days at different times in the year:

On April 17th, seven students were straightening up the terraces for grapevines and sodding the steep portions: one was transplanting in the nursery; one was pruning in the apple orchard; one showed visitors about; two were filling uneven places on the lawn; three worked in the greenhouse; one worked cleaning up the drives: one cared for the tools; one the hot beds; one removed nursery stock from the new vegetable garden; one top-grafted in the apple orchard; five with team and teamster drew dirt to fill the hole on the flats from which muck had been taken: three dug out and cut up dead trees from the grounds; two spread manure on the vegetable garden.

On May 30th, three worked in the vineyard; one spread manure; one went to help about the apiary; one trimmed small fruits; one hoed experimental grasses; one worked on drives; one showed visitors about; three dug out old dead trees in the apple orchard; one delivered vegetables to the boarding hall and the professors' houses; one picked up litter about the buildings; one dug out old trees on the lawn; two raked up dead leaves; one set out late tomatoes, one had charge of the tools and repairs; two worked in the greenhouse.

On August 31st, two helped Professor Cook look after the apiary; one worked on rustic seats for the lawn; one tended to the small fruits; one collected grasses for the centennial; four raked and trimmed the drives; one changed the bands for the last time this year on the trunks of the apple trees; two mowed lawn; two worked in the greenhouse; one cleaned up the lawn; one hoed over a piece of quack grass; four worked on a bog garden and pond for some wild plants; one delivered vegetables; one painted rustic work; one paved a gutter; one repaired in the college hall; four sawed and split up old trees dug from lawn; one trimmed trees in the grove.

Two of the Juniors have been keeping a calendar of operations in the horticultural department beginning with the opening of the college year. For various reasons it is quite incomplete.

LANDSCAPE GARDENING

This is in the course for the last six weeks of the year. No record of the class appears at this time, because the report only covers nine months of the year. The time for making our report is three months earlier than usual.

BOTANY.

On account of a change in the programme of studies, in future six weeks of this course is to come in the senior year. The members of the present sophomore class were to receive four weeks' instruction in botany this year, but on account of ill health I was unable to instruct them during the last two weeks.

The freshmen,—sixty-seven of them,—devoted one-third of their time each day for the second term and for one-half of the third term,—eighteen weeks,—to botany. They began as other classes have begun for several years past, by studying carefully some common plants in all their parts so far as they could see with the unassisted eye. No books were used for some weeks. After beginning as above stated, they each used dissecting microscopes. Our mode of procedure is difficult to describe to one not accustomed to it, but teacher and pupils all agree that it was one of the most interesting and profitable parts of the course. The class was met in two sections an hour each day. After the first lesson, each student was given some specimens of one or two species, or told what to get and where he could find them. These he looked over carefully and studied for his succeeding lesson. They received credit for answers or reports of good accurate observations, as for other recitations of lessons learned from a book. The mode is much the same as the one pursued by the late Professor L. Agassiz with his special students, and the one adopted, with some modifications, by many of his most successful pupils.

For the best results, and thorough work in studying the structure of plants, the classes were much too large. This is not merely my own opinion, but that of Professors Gray, Goodale, and Farlow of Harvard; Eaton of Yale, and Prentiss of Cornell University.

I believe our students have learned that to find the mere name of a plant by running hastily through an artificial key is of very little importance. But little time is spent in such work. We made use of Wood's Botanist and Florist. The very meagre and often incorrect portions of the text in structural botany were noted by lectures in which the subject was treated more in detail.

The portion treating of microscopical parts was presented entirely by lectures. To each student were shown about sixty slides or fresh preparations under the compound microscope. Seeing these slides is much better than nothing, though I think it quite superficial. It was the best I could do under the circumstances. It is to be compared to a course in analytical chemistry where the professor should perform all the analyses and write out all the results, the formulæ for the reactions, etc., and then show the test tubes and filters and the figures to the student.

To do real satisfactory work, each student should prepare some or many of his slides and study them thoroughly. He should have considerable practice with the compound microscope at his table in a well lighted and well equipped laboratory for the purpose. The time has gone by when a person can be considered a good botanist who has mere surface botany,—who has not had considerable practice in the work above proposed. We expect the time will soon come when the Agricultural College of Michigan shall afford ample facilities for this important work. Is it too soon now?

In the second term seven lessons were given to our native ferns; six days to greenhouse and other ornamental plants.

A written examination followed the close of the first term, and another will follow the middle of the second term.

A careful record of scholarship is preserved by marks in a scale from 0 to 10.

A written examination follows the completion of each study, and those students are recorded *passed* in that study whose examination marks equal 7, while their regular average exceeds 5; or those, the sum of whose regular and examination marks equals or exceeds 13. Students present at less than four-fifths of the class exercises in any study are required to pass a special and more extensive examination, with a standing at least 7.

QUESTIONS IN HORTICULTURE FOR 1876.

Time for writing answers one hour and a half.

1. What is a good location for a garden?
2. How would you treat very light soil.
3. Difficulties in keeping manure after you get it.
4. How to manage a compost heap of horse manure where a litter of straw has been used.
5. How to apply fine manure; how to apply coarse manure.
6. What is green manuring? When used and how?
7. When and how to use the roller.
8. How to mark out straight rows, and the advantages in having them straight.
9. Construction of sash, etc., for hot beds.
10. Management of hot beds when made.
11. How to raise good tomato plants for the early crop.
12. Name six tender vegetables sensitive to frost.
13. How to make a nice bed of asparagus for family use.
14. What is a good yield of watermelons and the ordinary profits with good culture?
15. What is the objection to planting an apple orchard with a thick growth of timber to the southwest?
16. How can you best raise early tomatoes.

QUESTIONS IN BOTANY.

First examination after studying twelve weeks.

1. Explain neutral, staminate, pistillate, monœcious, diœcious, naked.
2. Name the chief deviations from the pattern flower and give an example of each.
3. Explain cohesion, adhesion, and give examples.
4. Explain hypogynous, perigynous, epigynous.
5. What is a papilionaceous flower? Give example.
6. What is a coma, a pappus? Give examples.
6. How does a stamen answer to a leaf; also the morphology of an anther which may be adnate, innate, versatile, or kidney shaped?
8. What names are used to describe the union of sepals, of petals, of stamens, with examples of each?
9. What are the leading kinds of aestivation—examples of each?
10. What are the leading kinds of compound pistils?
11. What is an achenium? a kernel of corn?
12. Describe by word or drawing a seed compylotropous and give two examples.
13. Describe by illustration the different kinds of dehiscence.
14. What is the morphology of a blackberry, a strawberry, and the difference between them?

15. What is the morphology of a peach?
 16. What is the morphology of a fig, and how does it compare with a sun-flower?
 17. How can you place the numbers on the scales of a cone and then determine the portion expressing its inflorescence?
 18. Explain the terms pinnate, palmate, ovoid, ovate.
 19. Give the morphology of tendrils, with examples.
 20. Compare a head and a raceme.
 21. Name the various transformations of the leaf.
 22. Describe and name the parts of an anatropous ovule.
 23. What are the requisites for germination?
- Questions in second term, not for the final examination, which has not taken place:
1. What are ferns?
 2. Describe the vegetation of the fern you have.
 3. Describe the fruit of the fern you have.
 4. Define Polypodiaceæ and name two genera.
 5. Define Adiantum.
 6. What is parenchyma, and what is prosenchyma, and where may each be found?
 7. Explain cell formation by conjugation?
 8. Describe bordered pits of coniferous wood, and state how they appear when viewed from various directions?
 9. Structure of scalariform vessels and dotted vessels, and where may each be found?
 10. What is chlorophyll and where found?

THE MUSEUM

of vegetable products has received no additions of much importance during the past year. My time has been closely occupied with other college work, and in preparing materials for the Centennial Exhibition.

THE CENTENNIAL EXHIBITION.

The last report contained an account of the forest products of Michigan, sent to Philadelphia. [A full list of the specimens of the forest products of Michigan sent to the Centennial Exhibition will be found in another part of this report.]

While writing this report, our papers are spreading the news all over the State that "The State Agricultural College receives a medal for its 'magnificent collection' of Michigan forest woods."

In the spring about ninety-five species of native and foreign grasses were sent to the centennial, in the form of small bunches an inch or two in diameter. These were accurately labeled with scientific name and common name, if the plant had any common name. In September about seventy-five more bunches were forwarded. These were also labeled like the first. Some of them were different from those sent in the spring. The last lot sent were all freshly gathered this season. The bunches were also larger, generally about four or five inches or more in diameter.

LIST OF GRASSES SENT TO THE CENTENNIAL EXHIBITION.

LATIN NAME.	Common Name.	Habitat.
<i>Agrostis perennis</i>	Thin grass.....	North America.
“ <i>scabra</i>	Hair “.....	“ “
“ <i>spica venti</i>	Spreading wind grass.....	Europe.
“ <i>stolonifera</i>	Creeping bent “.....	“
“ <i>vulgaris</i> , var.....	Rhode Island bent grass.....	North America.
“ “.....	Ret-top.....	“ “
<i>Avena flavescens</i>	Yellow oat grass.....	Europe.
“ <i>hirsuta</i>	Fairy oat grass.....	“
“ <i>sativa</i>	Oats.....	“
<i>Andropogon sorghum</i>	Sorghum.....	Old world.
“ <i>furcatus</i>	Beard grass.....	North America.
“ <i>scoparius</i>	“.....	“ “
<i>Anthoxanthum odoratum</i>	Sweet-scented vernal grass.....	“
<i>Arrhenatherum bulbosum</i>	Oat-like grass.....	Europe.
<i>Alopecurus aristulatus</i>	Wild fox-tail.....	“
“ <i>pratensis</i>	Meadow fox-tail.....	“
<i>Ægilops cylindracea</i>	“.....	Europe.
“ <i>ovata</i>	“.....	“
<i>Bromus Kalmii</i>	Wild chess.....	North America.
“ <i>sterilis</i>	Barren broom-grass.....	Europe.
“ <i>macrostachys</i>	Broom-grass.....	“
“ <i>madritensis</i>	“.....	“
“ <i>erectus</i>	Upright oat-grass.....	Europe.
“ <i>mascinus</i>	“.....	“
“ <i>secalinus</i>	Chess (in wheat-fields).....	“
“ <i>Schraderi</i>	Schrader's bromus.....	“
“ <i>ciliatus</i>	Wild chess.....	North America.
<i>Briza maxima</i>	Quaking grass.....	Europe.
<i>Cinna arundinacea</i>	Wood reed grass.....	North America.
<i>Chloris radiata</i>	“.....	“
<i>Corynephoris canescens</i>	Gray club grass.....	Europe.
<i>Calamagrostis Canadensis</i>	Blue joint.....	“
<i>Danthonia spicata</i>	Old fog—wild oat-grass.....	North America.
<i>Dactylis glomerata</i>	Orchard grass.....	Europe.
<i>Elyusine corocana</i>	“.....	Japan.
<i>Elymus Europeanus</i>	Wild rye.....	Europe.
“ <i>Canadensis</i>	“.....	North America.
“ <i>Virginicus</i>	“.....	“ “
“ <i>striatus</i>	“.....	“ “
<i>Eatonia Pennsylvanica</i>	“.....	“ “
“ <i>obtusata</i>	“.....	“ “
<i>Eragrostis poaeoides</i> , var. <i>megastachya</i>	“.....	Europe.
<i>Festuca Hallerii</i>	Haller's fescue.....	“
“ <i>heterophylla</i>	“.....	“
“ <i>ovina</i>	Sheep's fescue.....	Europe.
“ <i>nutans</i>	“.....	North America.
“ <i>glaucescens</i>	“.....	“
“ <i>rubra</i>	Purple fescue.....	“
“ <i>duriuscula</i>	Hard “.....	“
“ <i>divaricata</i>	“.....	“
“ <i>viride</i>	Green “.....	“
“ <i>cynosuroides</i>	“.....	“
“ <i>elatio</i>	Meadow “.....	“
<i>Festuca loliacea</i>	Darnel spiked fescue.....	Europe.
<i>Glyceria nervata</i>	Fowl meadow grass.....	North America.
“ <i>fluitans</i>	Reed “.....	“ “
“ <i>aquatica</i>	“.....	“
“ <i>Canadensis</i>	Rattlesnake grass.....	North America
<i>Gymnostichum hystrix</i>	Bottle bush “.....	“ “

LIST OF GRASSES—*Continued.*

LATIN NAME.	Common Name.	Habitat.
<i>Hordeum maritimum</i>	Sea-side barley.....	Europe.
“ <i>jubatum</i>	Wild barley.....	North America.
<i>Holcus lanatus</i>	Meadow soft grass.....	Europe.
<i>Koleria glauca</i>		
“ <i>valisclia</i>		
<i>Leersia oryzoides</i>	Rice cut-grass.....	North America.
<i>Lolium italicum</i>	Italian rye-grass.....	
“ <i>perenne</i>	Ray, rye-grass, darnel.....	Europe.
<i>Milium multiflorum</i>		North America.
<i>Muhlenbergia glomerata</i>		“ “
“ <i>sylvatica</i>		“ “
“ <i>Mexicana</i>		“ “
<i>Oryzopsis asperifolia</i>	Mountain rice.....	“ “
“ <i>Canadensis</i>	Wild rice.....	“ “
<i>Poa vitellina</i>		Europe.
“ <i>trivialis</i>	Rough meadow grass.....	“
“ <i>nemoralis</i>	Wood “ “.....	“
“ <i>alpina</i>	Alpine “ “.....	“
“ <i>pratensis</i>	June grass, Ky. blue-grass.....	
“ <i>compressa</i>	Wire grass.....	Europe & N. A.
“ <i>serotina</i>	Fowl meadow grass.....	North America.
<i>Phleum pratense</i>	Timothy, herd's grass.....	
<i>Phalaris arundinacea picta</i>	Ribbon grass.....	North America.
“ <i>carulescens</i>		
“ <i>arundinacea</i>	Ribbon grass.....	North America.
“ <i>paradoxa</i>		Europe.
<i>Paspalum elegans</i>		North America.
<i>Panicum capillare</i>	Hair grass.....	Europe.
“ <i>sanguinale</i>	Finger grass.....	“
“		Colorado.
“ <i>Germanicum</i>	Millet.....	Europe.
“ <i>latifolium</i>	Broad-leaved panicum.....	North America.
“ <i>virgatum</i>		“ “
“ <i>clandestinum</i>		“ “
“ <i>crus galli</i>	Barn-yard grass.....	Europe.
<i>Spartina cynosuroides</i>	Cord grass.....	North America.
<i>Setaria verticillata</i>		Europe.
“ <i>viridis</i>	Green fox-tail.....	“
“ <i>glauca</i>	Fox-tail.....	“
“ <i>macra cheta</i>		
“ <i>Italica</i>	Millet.....	
<i>Secale cereale</i>	Rye.....	Europe.
<i>Sorghum nutans</i>	Indian grass.....	North America.
<i>Triticum imbricatum</i>		
“ <i>violaceum</i>		North America.
“	Kansas grass.....	“ “
“ <i>repens</i>	Quack grass.....	Europe.
<i>Carex</i>	Sedge.....	North America.
<i>Medicago lupulina</i>	Black medick.....	Europe.
“ <i>sativa</i>	Lucerne.....	“
<i>Vicia sativa</i>	Spring vetch.....	

Three bunches of pop-corn—Esselstyn & Co., Lansing.

“ “ “ “ —J. J. Sidway,

“ “ “ “ —Agricultural College, Lansing.

POTATOES SENT TO THE CENTENNIAL EXHIBITION.

At the time of sending the last lot of grasses, about two hundred and fifty varieties of potatoes were also sent. These were rather small in size on account of the season. They would not have been sent had not plates and space been engaged when the prospect seemed good for a nice crop. They were all labeled. Twenty of them were new sorts, lately originated at the College.

For a list see the following page, 37 of this report.

THE STATE FAIR.

Partly on account of exhibiting at the centennial and for other reasons, the College made no attempt to make an exhibition at the State Fair. On my own responsibility I sent a fine banana, in fruit. This attracted a good deal of attention, and many stopped to read the label which gave the names and explained the habitat, mode of growth, etc. From the State Fair the plant went to the Kalamazoo County Fair.

THE GREENHOUSE AND ORNAMENTAL BEDS.

But few changes have been made since my last report. The species and varieties have been somewhat increased by exchanges, by purchase, and by three small boxes from the agricultural department at Washington.

The walls for the two propagating pits are still covered up, waiting for means to cover them with wood and glass. They are much needed.

The cuttings and small plants obtained last year are mostly doing well, and many of them are beginning to make quite a display.

The houses continue to attract many visitors. The flower beds have done better than last year, as the season has been more favorable. On May 23d, after our bedding plants were put out, a frost injured many of them, and killed others entirely. On June seven a frost killed a few tricolor geraniums and coleus.

Late in August another frost did some damage, though most of the plants remained in good condition till October sixth, and some of them later.

On account of our frosty location and the short summers here, little attempt is made to use some of the bedding plants which are considered of most value farther south, or in places with longer summers. Among these are scarlet sages, dahlias, *vinca alba*, and *vinca rosea*.

MOST PROMINENT PLANTS.

Verbenas with us are very satisfactory for bedding. They are easily managed and flower profusely for a long season. We bend them down and keep them next to the ground by small stakes. In this way the stems throw out roots. Those raised from home-grown seeds do best, as they are more thrifty and free from mildew. The difficulty in raising them from seeds is this: we do not know what colors we shall get. Some of the best varieties are velvet mantle, sambo (black), coerulea (blue), bride (best white and sweet scented), defiance, a good old scarlet variety, which is in great demand. The Mrs. Woodruff is crimson. For bedding and ribbon beds we are especially well pleased with variegated sage (*Salvia officinalis* var.), alternantheras, variegated sweet alyssum, centaurea gymnocarpa, cineraria acanthifolia. Some of our

RIBBON BEDS

this summer have been made up as follows: Pelargoniums known as General

Grant for a center or the main part of the bed, with a border of *Senecio lanata* (*Gnaphalium lanatum*). The border needs a little clipping occasionally. A nice bed can be made with dark verbenas (sambo) bordered with golden feverfew. Remember to keep the center buds of the feverfew picked off to prevent it running to flower.

Another bed had a coral tree for a center (any small dense shrub would answer us well), then a ring of *centaurea gymnocarpa*, then a ring of *achyrantes Linderii*. The latter is of a beautiful red color, but is inclined to grow too tall. It needs frequent pinching. Outside of the latter is a row of variegated sage (*salvia officinalis*, var.), then a row of *alternanthera magnifica*. The above bed was too small, being only about eight feet in diameter, yet it was much admired.

Another small bed had a tree for a center, then *artemisia acanthifolia*. This is too ragged. Then came a ring of *centaurea candidissima*.

Another circular bed, fourteen feet across, had a center of twenty small plants, of *Colocasia esculenta* (caladium). This burned in hot weather and did not do very well. Next came a ring of coleus called sambo or rubra. It is a good sort, and did well. Then came a ring of *cineraria acanthifolia*. This was rather too small to match with the rest. Next came *achyrantes verschaeltii*, and the next was variegated sweet alyssum; then golden feverfew; next *alternanthera versicolor*. In the center, instead of *colocasia*, place coleus *verschaeltii*, and the bed would be made up of a good selection.

Our flat beds did better than those much elevated. The soil is rather light and some days of our summer very hot.

We find it a great advantage to mulch with old manure about two inches thick. The plants do much better than with frequent hoeing without mulch.

FLOWERING ANNUALS.

For flowering annuals, nothing gives us greater satisfaction than good strains of petunia. The best way is to save seeds, and keep saving every year after getting started with good colors. They thrive in our hot weather, and give plenty of flowers constantly after they begin until frost comes. Of great value also are the several sorts of *Phlox Drummondii*. No garden can afford to be without them. Pansies do well for fall and spring in cool weather. Do not allow them to flower in hot weather, when the flowers will be small and worthless, but pinch out the head and then the plants become strong for fall use. Pansies thrive in cool, damp weather. In our short summers, zinneas are very satisfactory if good sorts are used; snap-dragon also, and larkspurs. Balsams do poorly on light soil in our summers. Asters of many sorts do well, but are an uncertain flower on account of blister beetles, which sometimes appear very suddenly in immense numbers, destroying a bed in a few hours, often before the insects are noticed. Marigolds are showy and easy to manage. Place them towards the back of a garden. Mignonette is good for bouquets and easily raised.

WALL FLOWERS

are not very satisfactory with us. This season our stocks have done remarkably well. Sow once for an early crop and then a later sowing for a succession.

A FRAUD.

By oversight we received, in a lot of imported seed, some *Leucanthemum vulgare*. This is spoken of as rare and new, and excellent for cutting. It is nothing but ox-eye daisy, a most pernicious and troublesome weed. It is a rare plant

on the College grounds, and on most farms of Michigan, and we hope it always may be.

Pinks are easily raised, they are fragrant, good for cutting, but not nice for beds to view at a little distance on account of their straggling habit.

This season tea roses have done very well with our heavy mulching. I often condemn tea roses as costing more than they come to, as hardly worth raising in pots or in beds in open air, but I take it all back when I see them opening their buds, which are perfection among flowers.

A few plants of the common feverfew should have been recommended in the list of bedding plants. The little white heads of double flowers are always welcome in summer for bouquets.

Of course we cannot help liking, for every body likes the large deep blue flowers of *Clematis Jackmanii*. It is a hardy shrubby vine, with slight protection, and easily managed. Every garden should contain them.

We have raised some new pelargoniums, one of which proves to be a good one, also a few dwarf fancy pelargoniums.

PLANTS THAT SELL BEST.

First, verbenas, especially the deep bright colors. Every one who has ever tried a bed of good verbenas always wants another.

Heliotropes are in good demand, especially the lighter colored varieties. Pelargoniums (geraniums) especially the brightest colors and the most hardy sorts. Those known as Lady Washington geraniums, have had a great run. The more delicate tri-colors are not in much demand here. The better double-flowered are increasing in popularity.

Roses are in good demand. People are often imposed upon in spring by buying roses which have been forced into bloom all winter. Of course they will do but little in the succeeding summer when they ought to be resting. Our plants are kept in a cool room, and are in good condition in spring for producing flowers the next summer.

Many people have trouble with roses in pots, tea roses, buy them when and where they will. The plants are often chilled by placing in cold air too early in spring, or often by too much exposure to the hot suns or in dry living rooms. Roses like a cool even temperature.

Fuchsias sell well, especially the winter flowering sorts such as *speciosa*. Large numbers are sold to take the place of those carelessly left in a sunny window of a warm day.

Monthly carnations are salable and very satisfactory for winter use. Some of our best are *President*, *Edwardii*, *La pureté*, *variegata*. Chinese primroses are also sold in considerable quantity. No plants give better satisfaction for the money. They flower all winter constantly, and bear hard usage well.

Oxalis grandiflora (pink flowered sorrel), is much sold. *Bouvardias* are nice, but require considerable heat. They are liable to dry up in a living room. Small plants worth about 20 cents each are most sought after.

Plants of *Begonia rex* in variety are sold as foliage plants, and give very good satisfaction. Some flowering species are in good demand, also *coleus* in spring. Among the best are *chameleon* and *verschaffeltii*. The latter is chocolate color and stands the heat well in open air. *Sambo* is a good dark one, *golden beauty* and *beauty of St. Johnswood* are favorites. The *Shah* is new and peculiar but does not stand sun well.

Cinerarias are great favorites for winter flowers in the greenhouse, but not very satisfactory for home use.

Ivy-leaved geraniums are in good demand. People do not like to trust to names, but want to see plants in flower when they buy.

FERNS.

Some ferns are becoming quite popular for basket plants, among them *Pteris serrulata*, *Adiantum cuneatum*, *nefrodium molle*, *asplenium bulbiferum*. The above are all good ferns for the living rooms at home.

Do you wonder why I have not given the common names? Because many of the plants have no common names, or if they have, they are not in general use; or there may be a different common name for each one of many sections of country.

WHO BUY PLANTS.

The taste for nice plants grows slowly. It is not confined to the wealthy, but rather the reverse. Many people in limited circumstances buy more plants than the wealthy; they admire them more and take better care of them.

The younger people, if educated properly in botany and horticulture, will raise more plants and flowers and learn to like them better.

THE LAWN

has improved in places where we have manured and mowed frequently, as west of the College Hall and about the Greenhouse, but in many places near the building the grass dries up with a few days of warm weather, because the soil is so light and poor. A little good soil has been added west of the Boarding Hall and north of it to fill up the inequalities.

Several tasty rustic seats have been made and placed about the grounds in suitable places.

A few trees have been set, including one group of elms, north of the boarding hall, not far from the road. Some evergreens have been set quite thickly for a screen southwest of the house and barn on the place occupied by Professor Beal, also to the southeast to hide the wood piles and out buildings. The young evergreens set in groups about the grounds have been well cultivated all the year. They have made a nice growth, paying well for all the trouble.

For want of team work, no gravel has been drawn to extend or to even repair the drives and paths.

Two large oaks east of the chemical laboratory have been removed because they were nearly dead. Also one north of the boarding hall and one west of the hall, another northwest of the college hall and another (red maple) east of the house of Professor Beal. These were all large trees, which died probably on account of the severe winters of 1873 and 1875. Quite a number of other small white oaks have died and have been removed.

Twice within six years I have ordered and set out in the best manner a good variety of choice, rare trees, some of them evergreens. Twice the cold winters have killed them or nearly killed many of them, notwithstanding they were well screened and mulched.

Nothing but iron-clads are safe for much time on these grounds or in this climate. Among the best evergreens hardy here are Norway spruce, Austrian pine, Scotch pine, white pine, cembrian pine, arbor vitæ, Siberian arbor vitæ, abies alcoquiana, dwarf pine, red cedar, savin, black spruce.

Hemlock spruces have all been much injured. Not one escaped, although we had quite a large number in various situations. Two out of six in a bed of rhododendrons were killed by a cold snow-storm, followed by a bright sun and thaw in March of this year. They were covered with a lattice screen.

Among deciduous trees the chestnuts continue to do well, with the exception to one side of the trunk of some of them. This year the first ripe nuts were raised. Horse-chestnuts do poorly, mountain ash also, and all the willows which have been budded or grafted in the top. Birches all thrive.

Some trees are very desirable on a place planted in groups, not too near the buildings, flowers and foliage plants are attractive, but none of them excel a well kept lawn on ground which has been well prepared and properly seeded.

SMALL FRUITS.

The rows of currants have been extended. The crop this year was excellent. We keep the bushes well mulched with straw and other coarse stuff, as tomato vines and cornstalks.

The strawberry crop has also been good. A new bed larger than the old one was set this spring. We have about thirty of the best sorts, including some of recent origin. These are planted in small beds. What few raspberry bushes we had bore well. Blackberries were not a good crop. A good-sized plat of gooseberries has been set.

Our new plat of raspberries of some 1,100 vines did very poorly, many of the plants dying. I think the plants of many of them were injured before we got them by alternately freezing and thawing during the open winter.

THE VINEYARD

has been extended further east along the river bank sloping to the south. Five rows now extend twenty rods long.

Posts of swamp oak have been set between every two plants in the rows. Three wires are stretched for support of the vines.

They are held to the post by a single eight-penny wrought nail to each wire on each post. The nail is driven below the wire till it only projects about an inch, then the head is bent over the wire. This is better than a staple, and cheaper. The wires are about ten rods long, passing through holes in the end posts, which are well braced.

At one end the wires are fastened to the post, at the other end they pass through the post and then through a two by four scantling, which is pried off from the post several inches and kept there by blocks to keep the wires tight and straight in summer. When we trim and lay the vines down the blocks are removed between the scantling and posts, letting the wires slack up during the cold weather to prevent them from breaking.

There are about 200 vines set, with space for new sorts which we may want to test. Last spring the terraces were well graded and nicely sodded on the south edge. The soil is mostly fine gravel and sand, though some of it to the east end has clay bottom.

Most of the vines are Concords, though some are Delawares. We have one or more vines of Ives' seedling, Hartford Prolific, Clinton, Rebecca, Taylor's Bullet, Cottage, Rogers' 19 perfected by Bradfield, Rogers' 1, 2, 3, 4, 5, 9, 15, 19, 30, 33, 39, 43, 44, 45, Croton, Maxatawny, Martha, Othello (dead), Creveling, Brant, Eumelan, Norton's Virginia, Iona, Adirondac (dead), Concord seedling by Bradfield, Delaware seedling by Bradfield, Cynthia, Allen's, Diana, Lady

(dead), Canada, Black Hawk, Israella, Seneca, Walter, Isabella, Alvey, Arnold's 16, Senasqua, Talman, Perkins. We have quite a number of our own seedlings, about 50, making about 100 varieties in the department.

Several of the older vines have been allowed to bear sparingly this year. I am quite encouraged and agreeably surprised with the quality of our Concord, Clintons, Taylor's Bullet, and several of Rogers' hybrids. The season has been unusually favorable for this locality. The vines have had good care.

We are so pressed for room in the green-house that the south room has not been used for a grapery, as first intended. Next season we hope to build a cheap new structure for a cold grapery.

FORESTRY AND NURSERY.

At present, this only contains a piece of land of about an acre and a quarter, but it will be extended next year. In this we are raising samples of all the trees and shrubs we can get in the State or any other places if there is any probability that they will be hardy. We are starting samples of osage orange, honey locust, pepperidge, etc.

We have thrifty young trees of apple, peach, pear, plum, cherry, and ornamental plants, such as roses, lilacs, spiræas, yuccas, peonies, etc., etc.

There are evergreens in variety, also European larch, beeches, alder, birches, and thirty-five species of shrubs and trees sent this year from the Bussey Institute, Mass. These, as well as everything in the plat, have done well this year.

In small quantity we are raising some timber trees. Seeds of black walnut and hickory planted as soon as gathered last fall failed to grow this year. Butternuts grew six inches to a foot, from seed, in one year. Basswood grew about a foot, but most seeds failed to grow the first year, although they were planted in the fall after gathering.

Sugar maples came up thick, but have grown only a foot at best, and most of them not over six inches. Beech grows slowly. Chestnuts grew well the first year: a foot high. The hot weather injured them some. Catalpas made a great growth, but are quite apt to die back some during the winter. Silver-leaved maples set out this spring when they were three feet high have grown well, some of them putting out new limbs four feet nine inches long. Honey maple or box elder (*Negundo aceroides*) grows sparingly along our streams. In the states west and south of us they are raised for timber, but here they are not promising, as they grow straggling and are often injured by the winters.

Some burr oaks have grown two feet in two years. The white ashes have come up first rate on our light soil. They have grown one to two feet this first year. The whole of them will average a foot and a half.

I think this raising of forest trees is a promising field to demand our attention. When these different kinds of trees are well started some people of our State will want to learn how each variety thrives, that they may plant also. Indeed it does not now seem too soon for some farmers to be starting for profit, a plat of hickories, black walnuts, and white ashes, and perhaps chestnuts, European larches, and others.

THE VEGETABLE GARDEN.

The crops have generally done well, though the season has been a remarkable one. Till some time in July there were plenty of rains and no very hot weather. Then the rains stopped and the sun shone out bright and warm. The sudden change seemed to check the growth of potatoes, beets, and some other vege-

tables. The earliest cabbage started in hot beds were nearly all destroyed by a maggot at the roots. No remedy was found effectual in killing them after they were discovered. We dug away the earth of some and applied a little sulphur, on others ashes, or super-phosphate, or hot water. None were saved.

Had we anticipated such trouble we should have tried some remedies earlier in the season to keep the fly from the plants. We have not yet found a remedy to keep the maggots out of our earliest crop of radishes.

On account of want of team work and skilled labor, want of money, extra Centennial work, and my illness in spring, but very few experiments were attempted this year. Of vegetables we raised but a few varieties, only those we knew to be good kinds for use at the boarding hall and in the families of the Professors.

We raised about 200 bushels of yellow danvers onions. The growth of the crop was checked in a way much like that of potatoes, which were very light and small.

Lima beans without poles, the tops being pinched off (the bean vines, not the poles), never did better than this year. Sweet potatoes also did better than for some years. Weeds in the garden are very scarce. I am more and more pleased every year with thorough culture in the vegetable garden. We prevent any from seeding as far as practicable, and if any stray weed escapes notice it is carried to a rubbish pile. Many kinds of weeds so prominent in most gardens are rarely now seen in the College gardens. I think we give no more work to the acre, probably not near so much, as many people do who raise abundant crops of weeds. We cultivate often, usually every three to six days in the most growing parts of the year. This is the easiest way, the least work, followed by the best results. When will all our farmers and gardeners learn it and practice it?

KILLING QUACK GRASS.

This vile pest has been well scattered about the lawns where it does little or no harm, as it very rarely matures any seeds, even if left to grow when it heads out. But we mow several times a year, and even if it were inclined to seed, none would mature on the lawns. Last fall, in a low place where the ground was rich and wet, the ground was a perfect mat of quack grass. We wanted to extend the garden that way. It was plowed in the fall quite late, and I think cultivated over a few times and harrowed. As soon as we could get on the ground this spring, even in the mud, it was cultivated every three to five days. When we were ready this year to sow ruta bagas not a stem or root of quack could be found alive. Had the plat been in a dry place, no doubt we could have killed it much easier.

Some grape vines near my house had been set out for a screen and allowed to run their own way and do the best they could, fighting a mat of quack about their roots. This spring it was plowed and spaded. A student watched it and hoed it over, sometimes every two days, occasionally using a horse and cultivator. The last spear was seen alive early in August. We attend to it and keep the leaves all out of sight. As soon as a spear gets in sight it is gaining in the strife. While kept down out of sight or cut off it is rapidly losing, especially in dry weather. It is nice sport to kill quack grass.

WILL POTATOES RUN OUT?

Again, as usual we have raised many varieties of potatoes, this year about two hundred and fifty. Two moderate sized tubers of each kind were used as

seed for six hills. They were planted on sod ground which had been seeded for several years. The ground was in good condition and had yielded two crops a year of orchard grass, clover and lucern. The soil was a sandy loam, plowed in the fall, cultivated and top-dressed with fine manure in the spring. In ordinary seasons the crop would have been a good one, but this year it was very light. The weather was very favorable till some time in June when it suddenly changed from cool and cloudy to hot and plenty of sun light. Potatoes almost stopped growing on account of the sudden change.

In former years the potatoes in small quantity, here noticed, were planted on old garden soil. I mean on soil which had been in cultivation for some years in succession. They have been manured in a variety of ways, not very heavily, but generally with a good dressing of fine manure and ashes. The potatoes have never been planted on the same piece of ground in two successive seasons, but they have been shifted about on similar soil, on different parts of about five to eight acres. Two years ago the number of varieties was much increased. Previous to that time, for some six years, there had been fifty to eighty varieties in the garden. For some years the yield has been carefully noted, usually by weighing the tubers of each hill, or each set of hills. Of course we should expect a variation in the yield for different hills in the same year of the same sort, even if we treated them in all respects as nearly alike as possible.

The chief object in planting so many kinds in this manner, is to watch the changes from year to year in yield, health, quality, etc. We all know for family use, that we cannot measure the value of a crop of potatoes by the scales or bushel-basket, still the yield is of great importance. The ideal potato must, at least, be productive of even-sized tubers close together in the hill, with few or no small ones. It must have full eyes and even surface, a light or red color or spotted, must be of good quality for all seasons of the year; and now that the beetles have become so troublesome, the model potato should ripen early in the season.

This season, the greatest yield for six hills was nineteen pounds and seven ounces; last year 21 pounds and 1 ounce for three hills. On no two years has the same variety headed the list in productiveness. This year it was Long Pond; last year, Early White; the year before it was Climax. In comparing the yield for the past two seasons, I find all those yielding well this year, yielded well last year; and that those yielding lightest last year, hold somewhere near the same rank this year.

In the report for 1868, before I came to the College, the comparative yield is given of fifty-five varieties of potatoes. With few exceptions the tubers of these have been used on the garden ever since. They have all decreased in yield, notwithstanding the garden is now much more productive of most crops than it was eight years ago. In 1868, Casco was reported as yielding at the rate of 340 bushels to the acre; last year three hills produced about half an ounce, although it was a remarkably good year for the yield of potatoes in our locality.

This year it ran out entirely. We did not get one tuber, not even a small one. In 1868, Colebrook gave at the rate of 155 bushels to the acre; Davis Seedling, 276 bushels; Prince Albert, 262 bushels; Coppermine, 176 bushels. Last year they yielded respectively, for three hills of each variety: Colebrook, 2 pounds 9 ounces; Davis Seedling, 5 pounds, 6 ounces; Prince Albert, 1 pound 11 ounces; Coppermine, 4 pounds 9 ounces. This year, Colebrook yields for six hills (twice as many hills as reported last year), not one tuber, large or small; Davis Seedling, not one tuber; Prince Albert, one-fourth of an ounce,—a few

very small tubers; Coppermine, $1\frac{1}{2}$ ounce. Other examples could be added of a similar nature.

The question as to whether varieties wear out has long been discussed. Mr. Knight, the famous English horticulturist, maintained that they did, and gave what he supposed were good illustrations to prove it. Others, since his time, as well as his contemporaries, believed otherwise. I have seen Indian corn which had been kept for ten or more years on the same farm. Although the farm was a good one and the land well managed, the ears of corn grew shorter, the kernels shorter and rounder at the ends. The corn mentioned was the white dent, in the latitude of Lansing, Michigan. I should be glad to hear from others who have kept the seed continuously on the same farm for many years. It is a common notion that sheep do better when changed occasionally from one farm to another, or from one neighborhood to another, even where they were under the care of a good master before changing.

It would be interesting to know whether any of these varieties of potatoes which have been kept here for some years would revive, if their seed were sent to distant portions of our country and well treated. To test this point, last spring, I sent tubers from our garden to Kansas Agricultural College and another set to Ohio Agricultural College, at Columbus. The professors of agriculture in each of those two institutions agreed to treat them the same as we have treated them, and report the result this fall for comparison. It may be said that the potatoes in the cases noticed above, ran out because they were not fairly treated, that they were not properly fertilized or cultivated, yet I do not think this the only cause. Of the newer sorts of potatoes, as lately of Early Vermont, Compton's Surprise, Brownell's Beauty, etc., planted on similar ground with similar treatment, we have raised excellent crops nearly every year. In this connection I may mention a fact, though some will doubtless find other explanations than the degenerating of varieties. In many parts of Southern Michigan the wheat crop is lighter than it used to be. The usual explanation given is that wheat has been too often raised on the same ground. But in many instances which have been noticed by our most observing farmers, a newly cleared piece of timbered land for its first crop does not produce nearly so well as in early times, say thirty years ago, when the country contained much land cleared every year. Perhaps the change in climate will account for the decrease in yield and quality of wheat on new land.

Below I give the name of the potatoes tried and the yield in pounds and ounces for six hills of each:

NAME.	YIELD.	NAME.	YIELD.
Long Pond.....	19 lbs. 7 oz.	Sutton's 100 Fold Fluke.....	10 lbs. 15 oz.
Missouri Round.....	16 6	Early Brown.....	10 14
Breese's Prolific.....	16 1	Ohio Russet.....	10 12
Snow Flake.....	15 13	Seedling Mercer.....	10 12
New Kidney.....	15 9	From Ohio.....	10 11
Early Don.....	15 4	Massachusetts White.....	10 8
Ohio.....	14 5	Lapstone Kidney.....	10 8
Early Violet.....	13 9	White Rose.....	10 6
Early June.....	13 9	Dover Seedling.....	10 6
Whipple's Seedling.....	13 3	Early Mohawk.....	10 5
Bradford's Seedling.....	13 2	Early York.....	10 5
Climax.....	12 8	Early Snowball.....	10 2
Peerless.....	12 6	Patterson's Regent.....	10 2
Early Manly.....	12 6	Carter.....	10 --
Great Britain.....	11 9	Early Hendall.....	10 --

NAME.	YIELD.		NAME.	YIELD.	
	10 lbs.	oz.		6 lbs.	oz.
West Windsor.....	9	13	Old Flesh Colored.....	6	--
Harrison.....	9	7	Dover.....	6	--
Bulkley's Seedling.....	9	7	Early Cottage.....	6	--
Extra Early White.....	9	7	Scotch Blue.....	6	--
Victor.....	9	7	Breese's King of Earlies.....	6	--
Strawberry.....	9	5	Ketchum's Seedling.....	5	14
Duke of Cumberland.....	9	4	Black Kidney.....	5	14
Early Minnesota.....	9	2	Blue Heron.....	5	13
Raspberry Leaved.....	9	1	Early Victor.....	5	12
Early Prince.....	8	15	Unknown.....	5	12
Early Handworth.....	8	14	Pigeon.....	5	11
Acme.....	8	14	Seedling Rock.....	5	11
Red Jacket.....	8	12	Red Kidney.....	5	11
Rough and Ready.....	8	12	Strawberry Mercer.....	5	8
Prarie Flower.....	8	11	Early California.....	5	8
Cheaney.....	8	10	Vandevere.....	5	7
Dagger.....	8	5	Early Indiana.....	5	6
Galva.....	8	4	Kansas.....	5	5
Alaska Blue.....	8	4	Compton's Surprise.....	5	5
Blue Pinkey.....	8	2	Hamburgh.....	5	3
Carpenter's Seedling.....	8	2	Worcester's Seedling.....	5	1
Concord.....	8	2	Mercer Seedling.....	4	15
Worcester.....	8	1	Jones' Seedling.....	4	14
Alpha.....	8	--	California Mercer.....	4	14
Tyrell No. 2.....	8	--	Snowflake (new and genuine).....	4	12
Early Favorite.....	7	14	King of Potatoes.....	4	12
White Rock.....	7	14	Alpha.....	4	11
Gardener.....	7	14	Napoleon.....	4	11
Jersey Peach Blow.....	7	12	Early Samaritan.....	4	10
Early White.....	7	11	Golden Don.....	4	9
British Queen.....	7	11	Rochester Seedling.....	4	9
Early Rose Horse.....	7	10	York's Seedling.....	4	7
Early Kidney.....	7	10	Davis' Seedling.....	4	6
Early Henry.....	7	8	Early Goodrich.....	4	5
White Merino.....	7	8	Patterson's Blue.....	4	5
Early Stevens.....	7	7	Delmahoy.....	4	4
Dwight.....	7	7	Ohio Chenango.....	4	4
Buckeye.....	7	6	Ferforshire Red.....	4	3
Carter's Early Forcing.....	7	6	Badger.....	4	2
White Cow Horn.....	7	6	Amazon.....	4	2
Fancy.....	7	5	Cow Horn.....	4	2
Mercer.....	7	5	— Seedling.....	4	1
Hillard.....	7	5	Early Russet.....	4	1
Wheeler's Milky White.....	7	4	Philadelphia.....	4	1
Granite State.....	7	2	Spotted Shaw.....	4	--
Quinby's Seedling.....	7	--	Dyckman.....	3	14
Missouri White.....	6	15	White Clinton.....	3	14
Ash-leaved Kidney.....	6	12	Irish Cups.....	3	12
Early Queen.....	6	9	Dr. Bretonnian.....	3	12
Guernsey.....	6	9	Royal Ash-leaved Kidney.....	3	10
Andes.....	6	7	Noyes.....	3	10
Early Lilac.....	6	6	Bulkley's Prince of Wales.....	3	10
State of Maine.....	6	6	Week's Seedling.....	3	10
Patterson's Albert.....	6	5	Breakfast.....	3	9
Western Chief.....	6	5	Fluke.....	3	8
Penn. Search Warrent.....	6	4	Ohio Mercer.....	3	8
Jackson White.....	6	4	Ohio Beauty.....	3	8
Early Dexter.....	6	3	White Sprouts.....	3	7
New Hartford.....	6	3	Old Kidney.....	3	7
Whig.....	6	3	Unknown.....	3	6
Farmer's delight.....	6	2	Lincoln Red.....	3	6
White Pinkeye.....	6	1	Philbrick's Early White.....	3	6
Early Peach Blow.....	6	1	White Chili.....	3	5

NAME.	YIELD.	NAME.	YIELD.
	3 lbs. 5 oz.		1 lbs. 5 oz.
Calico.....	3 4	Rusty Coat Pinkeye.....	1 lbs. 5 oz.
Fancy Red.....	3 3	Sutton's Red Skin Flower	
Excelsior.....	3 3	Ball.....	1 4
Titicaca.....	3 2	Sutton's New Hundred Fold	
Ash-leaved Fluke.....	3 2	Fluke.....	1 4
Adirondac.....	3 2	Central City.....	1 4
.....	3 1	Prince of Wales.....	1 4
Davis.....	2 14	Jenny Lind.....	1 4
Nova Scotia.....	2 13	Black Chenango.....	1 3
Mexican.....	2 13	Ash Top Fluke.....	1 3
Black Diamond.....	2 13	White Mountain.....	1 2
Early Golden.....	2 12	Early Sovereign.....	1 1
Early Pearson.....	2 12	Frankfort.....	1
Skerry Blue.....	2 11	Heason.....	1
Oneida.....	2 10	DeBliss.....	15
London White.....	2 10	Minnesota Seedling.....	15
Purple Mercer.....	2 9	Pole Blush Pinkeye.....	15
Union.....	2 7	Gleason.....	10
Late Peach Blow.....	2 6	Hampshire Seedling.....	10
Great Western.....	2 6	Buell's Seedling.....	9
White-eyed Peach Blow.....	2 5	Kearsarge.....	8
Garnet Chili.....	2 5	Forest Rose.....	8
Brownell's Beauty (diseased)	2 4	Early Shaw.....	7
Alexander.....	2 3	No Blow.....	5
Late Red.....	2 2	Old Red.....	4
No. 2, Chili.....	2 2	Snow Flake.....	4
Early Purple.....	1 15	No. 1, Tyrell.....	4
Early Scotch Cottage.....	1 15	No. 2, Bush.....	3
White Chili.....	1 14	Grey Russet.....	3
Scotch White.....	1 14	Late Pinkeye.....	2½
Red Streak.....	1 13	Scotch Sebec.....	2
Mona's Pride.....	1 11	Copper Mine.....	1½
Patterson's Early White.....	1 10	Nansemond.....	1
Farmer's Delight.....	1 10	Cherry Blow.....	½
Irish Blue.....	1 9	German Russet.....	½
California.....	1 8	Prince Albert.....	¼
Snap Dragon.....	1 8	Pacific.....	?
Hollyhock.....	1 8	Davis Seedling.....	0
Early Vermont.....	1 8	Mountain June Pinkeye.....	?
Yankee Flat.....	1 8	Bradford Red.....	0
Irish American.....	1 8	Early Pinkeye.....	0
Improved Ash-leaved Kidney	1 6	Multiply.....	0
Snow Ball.....	1 6	Cold Brook.....	0
		Merino.....	0

NEW SORTS.

	Yield, three hills.		Yield, three hills.
No. 1.....	3 lbs. 13 oz.	No. 11.....	4 lbs. 12 oz.
2.....	3 13	12.....	1 1
3.....	2 4	13.....	3 11
4.....	1 8	14.....	6 6
5.....	2	15.....	3 5
6.....	3 14	16.....	9 12
7.....	1 10	17.....	5 11
8.....	3 13	18.....	3
9.....	4 10	19.....	2 9
10.....	4	20.....	4 3

EXPERIMENTS WITH POTATOES IN KANSAS.

Since writing my report of experiments on potatoes, I have received a report from Kansas Agricultural College, where I had sent samples of our potatoes to test, for comparison.

Professor E. M. Shelton writes: "I enclose a partial list of the results by weight of the yield of the potatoes which you sent me last spring. These potatoes, one of each variety, were each cut in three pieces and planted in three separate hills on May 12th. This was very late planting for this country,—three or four weeks late on account of wet weather. The yield is very light, but under no circumstances will potatoes yield in Kansas as they do in Michigan. A part of the potatoes gave absolutely no yield, and a few others returned only three or four potatoes, no larger than marbles. These [he says], I have not reported. The potatoes were harvested Sept. 13th."

COMPARISON OF RESULTS.

The reader must bear in mind that we planted and report the result of six hills of each variety, just twice the amount planted in the experiments in Kansas.

It does not seem necessary to report the whole list with weights, as they were sent from Kansas.

On looking over that list and comparing with ours, I find among the twenty-five lowest on our list, there are only four which are included in the Kansas list, viz.: Prince Albert, yielding 2 oz.; Sebec, 1 oz.; No. 2 Bush, 1 oz.; Early Shaw, 3 oz.

In the list sent from Kansas, I report the 25 varieties yielding least, viz.:

*Sebec.....	1 oz.	Early Queen.....	2 oz.
Early Henry.....	1 oz.	Black Diamond.....	3 oz.
*No. 2 Bush.....	1 oz.	*Snow Ball.....	3 oz.
Dwight.....	1 oz.	*Seedling Rock.....	3 oz.
*Fluke.....	2 oz.	*Early Minnesota.....	3 oz.
*Early Stevens.....	2 oz.	Rusty Coat Pinkeye.....	3 oz.
Improved Ash-leaved Kidney.....	2 oz.	Nova Scotia.....	3 oz.
*Prince Albert.....	2 oz.	Calico DeBliss.....	3 oz.
White Club.....	2 oz.	Ledding's Seedling.....	3 oz.
Great Western.....	2 oz.	*Early Shaw.....	3 oz.
†Brownell's Beauty.....	2 oz.	State of Maine.....	3 oz.
*Napoleon.....	2 oz.	Pale Blush Pinkeye.....	3 oz.
*Calico.....	2 oz.	*Prince of Wales.....	3 oz.
Purple Mercer.....	2 oz.		

I give a list of 27 varieties, all those reported from Kansas, as yielding one pound and over for three hills. The seed for all these had only been used one year at our College, except two, *Climax* and *Breese's King of the Earlies*, which had been used here seven or eight years in succession:

Unknown.....	2 lbs., 12 oz.	Breese's King of Earlies....	1 lb., 2 oz.
Kansas.....	2 lbs., 4 oz.	Early Snow Ball.....	1 lb., 1 oz.
Farmers' Delight.....	2 lbs., 3 oz.	Ketchum's Seedling.....	1 lb., 6 oz.
Long Pond.....	2 lbs., 1 oz.	From Ohio.....	1 lb.
Great Britain.....	1 lb., 10 oz.	Duke of Cumberland.....	1 lb., 1 oz.
Cheenery.....	1 lb., 15 oz.	Rough and Ready.....	1 lb., 6 oz.
Carpenet's Seeding.....	1 lb., 12 oz.	Early York.....	1 lb., 2 oz.
Red Jacket.....	1 lb., 12 oz.	Early Russet.....	1 lb., 4 oz.
Early May.....	1 lb., 10 oz.	Climax.....	1 lb., 5 oz.
Victor.....	1 lb., 9 oz.	White Rose.....	1 lb.
Breakfast.....	1 lb., 14 oz.	Dover Seedling.....	1 lb.
Ohio Beauty.....	1 lb., 9 oz.	Early Samaritan.....	1 lb.
Breese's Prolific.....	1 lb., 6 oz.	Whipple Seedling.....	1 lb.
Hillard's.....	1 lb., 2 oz.		

*Seed kept at College 7 or 8 years.

†Seed diseased.

It will be seen that of the above, twelve are among the twenty-seven giving greatest yield at this place.

We expect a continuation of these experiments next year.

RAISING NEW VARIETIES OF POTATOES.

Year before last, one of our students sowed seeds of the potato in a rich spot, as soon as the ground could be worked. Several plants produced tubers three or four inches long and of good shape.

Last year I saved a nice lot of seeds from the balls of about fifty different varieties of potatoes. These were sown in boxes, in hot beds, or in the greenhouse, about the time we sowed seeds for early tomatoes. They were pricked out once and set about two inches apart each way. After all danger from frost was over, they were transplanted into rows in the garden. In the rows they were set only about a foot and a half apart. This in many cases proved too close, as the tubers of different hills were often more or less mixed. About six hundred plants grew and produced tubers. Frost held off well, till October the sixth. In most cases the yield and size of the potatoes were quite surprising to me. Instead of a few little tubers, the size of bullets, they were frequently four or five inches in length, and of good size. In one instance, one plant produced eight pounds of tubers, many of them good size. The yield in many cases was better than for hills where we had planted old tubers for seed.

I intend to test them all next year, and will then likely throw most of them away, keeping only those of greatest promise. Enough has been done to show that farmers must have new varieties of potatoes every few years, as the old ones degenerate in size and quality in most cases if not in all. It is so easy, and so interesting too, to raise a few that, I believe, many intelligent farmers will soon make it a common practice.

It is interesting and somewhat amusing to read of the yield and size of the potatoes the first year from the seed in some recent experiments in England, as reported in a late number of *The Garden*, Oct. 28. I make a few extracts:

In April, the seeds were sown in pots or pans, under glass, in a cool house or frame. "Seedlings were raised in large pots under glass, producing tubers varying in size from that of a pea to a filbert. During the past summer these have undergone a second season's growth in the old Woodstock rectory garden.

* * * That some of the large cropping qualities of the late rose were secured, was evident from the fact that three minute sets of one kind produced over seven pounds of fine tubers." Any one who has raised new sorts can fully understand what is said of "the tending and harvesting of the berries, the sowing of the seed in the following spring, and patient waiting through the summer for the tardy development, the lifting of the produce, and marking of the chief features of each plant, and its produce, the winter-storing, the replanting the next year for the most important trial, the eventual weeding out in the autumn, and the final saving of those for further trial that appear to come nearest to the desired form. Any good collection of potatoes exhibits wondrous variety in color, form and general character, a fact which suffices to show that seedling roots may now and then produce varieties which shall more than repay the raiser for his industry."

In the above extracts I have purposely omitted any mention of cross-breeding or hybridizing potatoes, as a future article, a lecture in this volume on Horticultural Experiments, will treat this most interesting topic somewhat in detail.

NEW VARIETIES OF OTHER PLANTS.

We have quite a lot of new grapes one year old from seeds of the Concord and the Delaware. Most of them are now better plants, as far as appearance is concerned, than many we bought last spring which had been raised from cuttings or layers. There are also some new lilacs one year old, quite a stock from seeds of two or three species of gooseberries, and some currants from seeds of six varieties, and a few strawberries.

Seeds are saved from several kinds of fruits for further experiment.

At the greenhouse are quite a lot of new geraniums, some fuchsias and verbenas.

THE COMPOST HEAP

is managed this year much the same as last. For want of team work, we are nearly one year behind in accumulating manure. We get most of it in a fresh state, unrotted in town. It is drawn in summer and winter and all used the next spring.

Some muck has been taken from number twelve to mix in alternate layers with the manure as it was composted. We have begun to draw from the swamp and dump near by on dry land to allow it to freeze this winter.

The flats back of the bee house where muck was dug out last year, have been nicely filled up again and evenly graded.

THE NEW ORCHARD.

We are located in a place subject to great extremes of heat and cold, the thermometer reaching 32 degs. and 33 degs. below zero.

In spring we have late frosts, in Autumn early frosts, in summer severe droughts. Fruit trees of some sorts, as Sweet Boughs and Baldwins, have been struck dead or have lingered a useless, hopeless life for a few years after the severe winters. Pear trees and cherry trees were killed. Beautiful, valuable trees are sadly missed. It has taken a little time for us to regain courage and decide what it is best to do—give up entirely or try again. Within twenty years, much has been learned in regard to hardy sorts and the best sites for orchards. Last spring, after a mild winter, I ordered trees a year old, of pears, plums and cherries. Some of them were two years old, but all sound and thrifty. They were selected in about the following proportions: Of pears, 5 Belle Lucrative, 5 Seckel, 5 Beurre d'Anjou, 5 Beurre Rose, 5 Bartlett, 5 Sheldon, 5 Howell, 5 Buffum, 5 Louise Bonne de Jersey, 5 Flemish Beauty, 5 Clapp's Favorite. Of plums, 7 Wild Goose, 7 Smith's Orleans, 7 Jefferson, 7 Washington, 7 Lombard. Of cherries, 10 English Morello, 10 May Duke, 15 Reine Hortense, 2 Yellow Spanish, 19 Belle de Choisy, 10 Governor Wood, 3 Black Eagle, 10 Elton, 17 Early Richmond. These were not for the purpose of raising fruit for market. The young trees were well set in nursery rows. Nearly all have made a good growth this season. The small trees were cheapest, most likely to live, transported with less risk, and contained more roots in proportion to the rest of the tree. We had an old pasture, a part of which was a strong clay plateau twenty to thirty feet above the surrounding land, with no screens of any kind. A year ago this fall it was broken up. This season it has been worked over, while it is now in excellent condition, very mellow, and rich enough. It was subsoiled. This fall it has

been scraped and smoothed down in all sudden irregularities. It was staked off according to the mode described by Thomas, the pears and cherries twenty by twenty feet, the plums twelve by twenty.

A few at a time of the young trees were carefully dug and set on the hill. Last spring they were small and had a fair lot of good roots; this fall they lose no roots in moving, and we find many in addition. The holes are dug and surface soil thrown in about the roots of the trees. The soil is moist enough. The roots are well placed and the soil well tread in about them. The trees are all set with the graft or bud-scar to the northeast and the trees all lean to the southwest. They will all be banked up a little. In a book a plat has been made registering the name and position of each tree. So far, I feel that we have done our part well, setting the trees on the most suitable spot on the farm. If they die next year it will not be our fault. I intend they shall be mulched three feet each way from the tree and cultivated with little or no manure, perhaps raising some beans or potatoes for a few years. I want them to grow rather slowly and may let the grass work in a little after a few years. This will depend on the growth and appearance of the trees.

THE APPLE ORCHARD.

In the spring of 1873, I began some experiments in cultivating about trees, in leaving them in grass and in fertilizing them with ashes and barnyard manure. Previous reports have contained some account of these experiments. The trees selected for this purpose were in ground as nearly of even quality as could be selected in the orchard. Most of the trees were of the same variety—Northern Spy.

When the experiments were undertaken the trees had all been in grass for several years. The grass had been mown and taken off the ground once or twice a year. All but part of three rows running north and south across the middle of the orchard have been cultivated each year since 1873. I may except part of two other rows which have been mulched for two seasons, or manured with fresh manure containing much straw. In some seasons the weeds were allowed to grow after cultivation had ceased, which was about the middle of August. Last year oats were sown in August; this year, buckwheat. The tilled portions were plowed shallow in the spring and harrowed or cultivated every two or three weeks. In the following table I give the number of the tree and the number of the row, the average growth made yearly by some of the best branches for several years previous to the experiment up to the present time; also the circumference of the trees in the spring of 1873, and again in autumn of 1876.

We cannot measure the health of apple trees by the tape line or yard stick much more than we can measure the health of an animal by the line or by the scales.

In 1868 the average growth of the twigs was generally about 15 inches; in 1869, 10 inches; in 1870, 9 inches; in 1871, 8 inches; in 1872, 6 inches; in 1873, 5 inches. In 1875 none of the trees bore any fruit to amount to any thing.

No. of Row.	No. of tree in Row.	Variety.	Growth in 1874.		Growth in 1875.		Growth in 1876.		Circumference in Spring of 1873.	Circumference in Fall of 1876.	Bushels of good Fruit.	Bushels of poor Fruit.	REMARKS.
			In.	In.	In.	In.	In.	In.					
11	1	Spy	---	---	---	---	---	---	---	---	3	3	Cultivated regularly. No manure.
11	4	Spy	10	9	9	---	---	---	---	---	1	2 $\frac{1}{2}$	Cultivated regularly.
12	1	Spy	7	6	6	23	27 $\frac{1}{2}$	---	---	---	3	3	In grass.
12	2	"	4	5	4	22	25	---	---	---	---	---	In grass.
12	3	?	---	---	---	25	---	---	---	---	---	---	In grass. Died 1875, healthy in 1873.
12	4	Spy	9	9	10	20 $\frac{1}{2}$	26 $\frac{1}{2}$	---	---	---	3	3 $\frac{1}{2}$	In grass. Fruit fine color.
12	5	---	5	5	3	19	22 $\frac{1}{2}$	---	---	---	---	---	In grass. Injured by winter on west side.
12	7	Baldwin	---	---	---	25 $\frac{1}{2}$	---	---	---	---	---	---	In grass. Dying, worthless in 1876. No fruit.
12	8	---	---	---	---	---	---	---	---	---	---	---	In grass. Dying, worthless in 1876. No fruit.
13	1	Spy	5	5	3	25	29 $\frac{1}{2}$	---	---	---	---	---	In grass.
13	2	"	4	4	3	24	28	---	---	---	---	---	In grass. Injured on west side. Sheds leaves early.
13	3	---	6	6	4	25 $\frac{1}{2}$	29	---	---	---	---	---	In grass. Injured on west side. Sheds leaves early.
13	4	Strawberry	9	5	5	27	31	5	5	---	---	---	In grass. Trunk split, sap runs in Oct., 1876.
13	5	---	6	6	4	25 $\frac{1}{2}$	28	---	---	---	---	---	In grass. Trunk split, sap runs in Oct., 1876.
13	6	Fall Pippin	5	1	2	---	31	$\frac{1}{4}$	$\frac{1}{4}$	---	---	---	In grass. Tree injured, about worthles.
14	1	Spy	4	3	2	23	27	$\frac{1}{2}$	$\frac{1}{4}$	---	---	---	In grass. Healthy, leaves fall early, fruit small, light color.
14	2	"	7	6	6	25 $\frac{1}{2}$	30	1 $\frac{1}{2}$	4	---	---	---	Leaves hold on very well, fruit all good size, high color. Poor ones all wormy.
14	3	"	5	5	4	25 $\frac{1}{2}$	29	1 $\frac{1}{2}$	3	---	---	---	In grass. Tree much injured, leaves drop early, fruit medium size, color high.
14	4	"	6	7	6	26 $\frac{1}{2}$	30	2 $\frac{1}{2}$	6	---	---	---	In grass. Trunk split, sap runs, leaves holding on well, fruit like tree above.
14	5	"	6	6	4	25	28 $\frac{1}{2}$	5	6	---	---	---	Healthy. For treatment see page—
14	6	"	9	8	8	26 $\frac{1}{2}$	31	2 $\frac{1}{2}$	7 $\frac{1}{2}$	---	---	---	Fruit good color.
14	7*	---	---	---	---	---	---	---	---	---	---	---	Healthy. For treatment see page—
15	1	Spy	15	12	12	---	26 $\frac{1}{2}$	1	1	---	---	---	Fruit uncolored, small.
15	2	"	9	9	6	25 $\frac{1}{2}$	---	1	6	---	---	---	Regularly cultivated, as were all trees in this row. Healthy, in a slight hollow. Fruit very wormy, uncolored.
15	3	"	8	8	6	26	31 $\frac{1}{2}$	4 $\frac{3}{4}$	6	---	---	---	Trunk split, sap runs, fruit very small, not very wormy.
15	4	---	8	8	6	26	31	5	4 $\frac{1}{2}$	---	---	---	Trunk split, sap runs, fruit good sized, not colored well.
15	5	---	8	8	7	25 $\frac{1}{2}$	30 $\frac{1}{2}$	2	5	---	---	---	Trunk split, sap runs, fruit good size, rather wormy.
15	6	---	---	---	---	---	---	4	5	---	---	---	Trunk split, sap runs, fruit small, uncolored.
15	7	---	---	---	---	---	---	3 $\frac{1}{4}$	3 $\frac{1}{4}$	---	---	---	Fruit small, uncolored.
		---	---	---	---	---	---	---	---	---	---	---	Fruit rather better than above.

Row 14—Total for 7 trees, 15 $\frac{1}{4}$ bushels good fruit and 29 $\frac{1}{4}$ poor fruit. Total 44 $\frac{1}{4}$.

Row 15— " " " 21 " " " 30 $\frac{3}{4}$ " " " Total 51 $\frac{3}{4}$.

* 1 $\frac{3}{4}$ bushels good fruit, 2 $\frac{1}{2}$ bushels poor fruit. Very large, uniform high color.

In row 13, which was in grass without culture, six trees at the north end of the row yielded about 15 bushels of good, well colored apples, and 15 bushels of poor apples. This is the row to be compared with the 15th row, which has been cultivated, and with the 14th row in grass, except a little culture about the trees, as follows: In row 14, tree number one has been kept in unmown grass without manure, except a space extending three feet each way from the tree. Number two has had the same treatment as number one, only the cultivated space has been eight feet each way from the tree. Number three was cultivated from the tree as far out as the limbs extended. Number four had a cultivated space three feet each way. Number five stood in the center of a square of grass 12x12 feet, and cultivated beyond. Number six stood in a square of grass 14x14 feet, with cultivation beyond.

In row 12, tree number one in the spring of 1873 had a dressing of one-third of a load of good manure placed around the tree, not more than three feet away. In the spring of 1875 half a load of good manure was placed in the same position. Tree number two had two dressings of manure of same quality and quantity at the same time, spread evenly four feet from the tree. The fourth tree had a similar manuring, only it was spread under the tree as far out as the tips of the limbs extended.

Numbers three and five were similarly dressed, except that the manure extended to the center line between these trees and the trees in the rows next to them. Number seven had the manure applied in a ring two feet wide, seven to nine feet from the tree. Number eight had a two-foot ring of manure under the ends of the longest branches.

CONCLUSIONS DRAWN FROM THESE EXPERIMENTS.

It is too soon to decide for certain from these few imperfect data, the best way to treat apple trees, as so much depends upon the soil, the variety of tree, the different seasons. Hardly any two trees of the same variety, treated in every respect alike, as nearly as can be, will produce an equal amount of fruit of equal quality. Each tree seems to have some individual characteristics peculiar to itself.

So far, on an average, the trees in grass, have grown slower, shed their leaves earlier, and have borne a less quantity of more highly colored fruit. We are experimenting to see which of the above fruits will keep the best under the same conditions.

Digging little circles about trees, and keeping the ground mellow and nice has little or no effect. I think we see a little difference in fruit and thrift of tree where the culture extends from the tree as far as the ends of the spreading branches. The two trees especially experimented upon with a patch of grass about the tree, and a clean culture beyond, behaved, so far as could be seen, precisely like those with perfectly clean culture from the tree in every direction. In some cases (we had many in different portions of the orchard), I think trees of Talman Sweet, and those of Rhode Island Greening, left in patches of grass extending as far as the limbs, were improved by digging up the grass, so the culture was complete, *i. e.* no grass grew anywhere near the trees.

It has taken about three summers for manure to show any results when spread on grass under trees. The *grass* showed the effect at once.

This year, for the first, the trees in grass showed a little better color in the leaf.

In the case with manure piled within three feet of the trunk, the tree showed

the effect of the manure this year. On digging down below the manure, which had kept the grass down, the soil was full of new roots of the tree. Some roots of trees are running here and there all over the soil. If they meet with plenty of food, they enlarge and send out more branches. In this case, it has taken a little time for the tree to increase the number of roots to take in the good food near the trunk. Other trees with manure spread all over the grass have shown some benefit sooner than the one last mentioned.

We have had two severe winters since beginning the experiments, in which the thermometer sank to 32° in 1873, and 33° in 1875. The trees well cultivated stood the winters better than those left in grass.

Perhaps I should repeat here what was stated in a previous report, that the trees now in grass were cultivated till they had been set about fourteen years.

OTHER EXPERIMENTS

have been going on for two years, as treating certain rows of trees to a bushel or more of unleached ashes to each tree spread evenly over the ground.

In autumn of 1875 a thorough mulch of old clover hay was put evenly under eleven trees, extending as far as the lines between this row and the rows on each side of it. These trees are on the east end of the sixth row from the south side, running east and west. This spring (1876) another heavy mulch of straw was added all over the same ground, so scarcely any thing could grow in the line of weeds and grass.

Seven trees, at the east end of the eighth row from the south, were this spring treated to a large load each of coarse manure, evenly spread, a rod from the tree each way. These mulched and manured trees had been cultivated for two years before. The manure on these trees showed itself in the greener color of the leaves this summer and autumn.

J. J. Thomas, the well known pomologist and so long one of the able editors of the *Country Gentleman*, visited the College apple orchard in the summer of 1873. He expressed great interest in these experiments, and has since made frequent quotations of our reports in the *Country Gentleman*, and last year (1875) made the following mention of them in his essay on "Culture of Orchards," read at the meeting of the American Pomological Society, held in Chicago.

"Prof. Beal, of the Michigan Agricultural College, showed me last year an orchard on the College grounds, which had been fourteen years planted, the trees being about twelve or fourteen feet high. The roots were found on examination to be thickly matted beneath the whole surface, or had extended so as to meet and cross each other, and were traced within six feet of the next rows, which were thirty-three feet apart. In other words, these trees, not over fourteen feet high, had thrown out roots to a distance of twenty-seven feet. The soil was a medium loam, and there is no reason to believe that this extent of roots was an exceptional case. There is no question that the roots of apple trees generally extend to a distance greater than the height. A part of the orchard just referred to had been plowed over the whole surface, after it had remained many years in grass. The result was a great increase in the vigor of the trees. Another portion was plowed, with the exception of grass circles ten feet in diameter, left at the base of the trunks. There was no apparent difference in the vigor of the trees where the whole surface was plowed, and where the ten feet circles were left in grass. This result is easily explained. The roots extending twenty-seven feet on each side formed a circle of fibres for each tree fifty-four feet in diameter, and this circle had an area more than twenty-four times as great as

that of the ten feet circle of grass. The reason is therefore obvious why no apparent difference was observed in the thriftiness of the trees where all the surface was cultivated, and where the circles of grass remained around them. Another portion of this orchard was left entirely in grass; and still another had ten feet circles cultivated around the base of the trunks. There was no perceptible difference in the appearance of the trees, the foliage in both cases being alike yellowish and unthrifty in appearance, and the shoots of feeble growth. The cultivated circles, ten feet in diameter, constituted but a twenty-fifth part of the area covered by the whole roots, as already explained. From the experiments it is obvious that but little advantage can result from the common practice of spading circles about fruit trees which stand in grass—unless the circles are very large, and for the first year or two after transplanting, while the roots are comparatively short. * * * These, as well as many other experiments which might be cited, prove the error of the common practice of applying manure to the roots in a circumscribed circle. Broadcast culture and broadcast manuring should be given to the whole surface of an orchard, unless to save labor small portions of grass are left at the foot of the trunk in horse cultivation."

THE CODLING MOTH OR APPLE WORM

has not been very troublesome this year. Bands about the trees have never caught so few in any season when there was much of a crop.

DEAD BALDWINS.

We have dug out a good many of these which were injured by previous cold winters. We treated them well, and waited for them to revive, but most of them grew worse instead of better.

A few of the Baldwins have borne a small crop this year. This tree is too tender for our locality. We cannot recommend it for cold countries.

TO INCREASE VARIETIES.

For experiment, we top-grafted numerous trees this spring, and set out some small trees to fill vacancies.

THINNING APPLES.

When the young fruit was about an inch in diameter, I placed several students in the orchard to thin out the poorest. We feared in some cases they were thinned too much, but the young fruit grew larger, and in all cases there was a plenty left,—often too many. On account of the abundance of fruit everywhere, my only regret in this matter is that I did not thin them more closely. Some trees were left without any thinning. The fruit was abundant in quantity, but poorer in quality, especially of the unthinned northern spys, which bore many small, poor apples.

I feel sure that nothing will pay better than a judicious thinning of apples. Especially will this prove true in years when fruit is likely to be abundant and the price low for inferior quality.

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OUTSIDE WORK.

The hardest work done outside of my regular college duties was the collecting and preparing the collection of the forest products of Michigan for the Centennial Exposition. The work proved of greater magnitude than I anticipated, on account of so many failures of people to fulfill promises in collecting specimens. The task was rendered more arduous, as most of it was done while I was in poor health. A disease which lasted a good part of the year was contracted while making the collection.

It cost more time and personal effort to prepare for the Centennial the list of native and foreign grasses than any one would suppose who has not undertaken a similar task. As in the case of the forest products, much of the work could not be trusted to any one else.

The list of 250 varieties of potatoes sent to Philadelphia was a small task compared with the two collections of grasses forwarded.

Ill health prevented me from taking an active part in the first farmers' institutes last winter. An essay on grasses was prepared and was printed in the last report.

I gave a short lecture at the December meeting of the State Pomological Society on the Forests of Michigan. A lecture was given at a farmer's fruit festival at Allen's, Hillsdale county, on the progress of Horticulture. The same was given to the students and faculty of the Agricultural College.

During a few days of the vacation in August I attended the American Association for the advancement of science, held in Buffalo, N. Y., and read four papers on the following subjects: Phyllotoxis of Cones; Can Unios See? The Fertilization of Apple Blossoms; Sensitive Stigmas as an aid to Cross-Fertilizations. Quite a number of short articles have been contributed to the American Naturalist, various agricultural journals of the country, besides answers to many inquiries as to names of plants and other subjects.

CLOSING REMARKS.

There are many experiments which I should like to try at the Agricultural College, but I am not certain that farmers are ready for them. If well carried out the best of them would require much thought and care in observing and recording all the points necessary. But few good experiments can be reasonably expected of the Horticultural Department while my time is more than filled with the duties of teaching and plans and oversight of every day work of the students. The writer is willing, and even desirous of trying some good experiments as soon as ways can be devised to carry them through.

Again, as last year and the year before, I am gratified to testify to the continued faithfulness of my assistants,—to Mr. Oscar Terrell, the teamster; to Mr. James Cassady, the gardener; to Mr. Charles W. Garfield, my foreman. I must also mention the unusual interest and faithfulness of many of my students while at work, especially some of the members of the Senior and Junior classes.

To the students I would say, the eyes of all the officers are upon you, eagerly watching for success while you are students here and after you leave the College. Meritorious work any where, in the class room, in the field, or in the garden stamps a favorable impression on the minds of all your instructors, who know you better than you can imagine or understand.

Respectfully submitted.

W. J. BEAL,
Prof. of Botany and Horticulture.

REPORT OF THE DEPARTMENT OF ENGINEERING AND
MATHEMATICS.

To the President of the Michigan State Agricultural College:

DEAR SIR:—I have the pleasure of submitting the following report of the character and amount of work accomplished in the department of Engineering and Mathematics, for the year ending Sept. 30th, 1876:

CIVIL ENGINEERING.

At the date of writing this report, somewhat less than one-half of this course has been finished, which fact may, perhaps, account for any incompleteness. Our course requires that the instruction in this study shall be given during twelve weeks of the Senior year. My present class contains 19 members, of whom two are in special courses.

Wood's revision of Mahan's Civil Engineering, though poorly adapted to our course, was retained as a text-book; partly because no book better suited for our use could be found, and partly, also, from the lack of completeness in my lectures.

My lectures cover subjects embracing the principles of framing; the strength of material; the analysis of roof and bridge trusses; criticism of existing roof frames, and bridges in the vicinity; principles of road making, and of farm machinery.

The instruction from the text-book is designed to cover the subjects of limes, mortars, cements, principles of masonry and carpentry, and description of noted bridges.

Practical problems in the designing of roof and bridge trusses will be given the students, and they will be required to bring in original designs of the requisite strength to suit the conditions given. Under this head, instruction regarding the principles, construction, and use of farm machinery, will be given as fully as the limited time at our command will permit.

The collection of mechanical models in the model museum, afford many valuable practical examples of mechanical principles. The crowded condition of the enclosing cases detract much from the interest of the collection. Properly, to arrange and classify the models will require three times as much space as is now used.

Through the courtesy of the principal bridge building companies in this country, I am enabled, by plans, to present clearly to the class the leading characteristics of the work of each.

ASTRONOMY.

Instruction in Astronomy was given six weeks to the senior class. Using White's Astronomy as a text book, the topics thoroughly discussed were as follows:

Definition of terms used in Astronomy: General phenomena of the heavens; astronomical instruments; parallax; methods of measuring, size, density, and velocity of rotation of the earth; methods of finding latitude and longitude; character of the earth's orbit; constitution of the sun; sidereal and solar time; the calendar, lunar, and solar eclipses, the planets and fixed stars.

Opportunity was afforded the class for observing Jupiter, Saturn, and the

moon, with the telescope, now on deposit at the College; also, several evenings were spent in the study of the configuration of the principal constellations. The use of a celestial globe, the private property of President Abbot, added much to the value of this course.

DRAWING.

Drawing is to be taught the last six weeks of the College year to the junior class.

The course consists of the principles of projection as used in simple mechanical and architectural pursuits.

Each student will be required to produce a set of ten drawings in India ink, and to have both execution and design above a certain standard.

MECHANICS AND PHYSICS.

The junior class in mechanics was in my charge for a few weeks near the close of the first term, which time was principally occupied in reviewing the work of the previous portion of the term.

The second term the same class in Physics, using Snell's Olmstead Philosophy as a text book, thoroughly passed over, and were examined on the subjects of hydrostatics, hydraulics, reflection and refraction of light, construction of lenses, the telescope, microscope and the steam engine.

SURVEYING AND LEVELLING.

Surveying and levelling were taught six weeks during the second term to the sophomore class.

On account of the large size of the class and the limited number of field instruments in our possession, it was taught throughout the term, alternating with Trigonometry. In this way the class were afforded opportunity for ample field practice.

Ray's Surveying, used as a text book, was supplemented by a few lectures and numerous illustrations.

The subjects discussed in our course of instruction embraced the theory, adjustment, and use of instruments; principles of rectangular surveying as practiced in government surveys; dividing land, finding section corners, retracing old lines, topographical surveying, railroad surveying, section and cross-section levelling, computation of earth work, and setting slope stakes.

The field work consisted of instrumental practice with the compass, chain, level and rod, of which each student was required to take part in four actual surveys.

Each student was also required to furnish himself with a few first-class drawing instruments and to construct an India ink map of one of his surveys, with an ornamented title. These maps were marked as to both design and execution, and counted a certain portion of the whole class work. Opportunity was given the class, through the courtesy of Mr. J. D. Stannard, of the senior class, to assist in running a preliminary railroad line, and of laying out a railroad course.

Our facilities for field practice are limited to compass surveying and levelling, while an extensive variety of more accurate surveying is entirely without our limits.

The opportunities for field practice this year would have been very meager, had not the donation of the class allowed us to purchase a second compass, at

small expense to the College, of somewhat more varied capacity than the one heretofore in our possession.

TRIGONOMETRY.

Trigonometry was taught the Sophomore class, that portion of the second term not devoted to surveying. Olney's Trigonometry was used as a text book, the class passing thoroughly over plane and right angled spherical trigonometry.

GEOMETRY.

Geometry was taught the entire portion of the first term, to the Sophomore class, using as a text book Olney's Geometry.

The class with few exceptions did well, and thoroughly passed over plane and spherical geometry.

The Freshman class has already been studying geometry four weeks, under my tuition. Judging from what has already been accomplished, they will do an unusually good term's work.

ALGEBRA.

Algebra was taught the entire first and second terms to the Freshman class.

From the fact that a great number of the students on entering College possessed a knowledge of the elements of algebra it was deemed advisable not only to divide the class, but to provide each section with a different text book.

The advanced section used Olney's University Algebra, and passed over an extensive course, including, differentiating, the binomial theorem, solution of cubic equations and probabilities.

The other section used Olney's Complete School Algebra as a text book, and with some unimportant omissions thoroughly completed the book.

RHETORICALS.

The rhetorical exercises of the Freshman class have been in my charge the entire year. The first term the class had exercises in composition with the professor of English Literature, and the rhetorical's consisted of exercises in reading. The remainder of the year the usual exercises of essays and declamations were required.

The class met at 7 A. M. Saturday, so soon after breakfast in the boarding hall as to cause necessarily more or less tardiness, otherwise the rhetorical's have been unusually free from distracting causes.

The exercises have been of an unusually good quality, the declamations well learned and delivered, the essays quite free from mistakes, and some of the original speeches really excellent.

BIBLE CLASS.

During the greater portion of the year I have had charge of a class of students in the Christian Union Sabbath-School on Sunday afternoons.

WORK OUTSIDE THE CLASS ROOM.

Connected as I am with the Engineering Department of the College, a large amount of outside work is of necessity required of me. In some instances afternoons and Saturdays for from one to three weeks consecutively have been required in performing these outside duties. They have consisted principally of surveying, levelling, mapping, or drawing. Under my direction the maps of the College farm and grounds, for the library and farm office, were finished and the topography put on them. All the drains constructed this year have been surveyed and recorded, together with the depth and rise or fall for each one hundred feet.

The west line of the farm has been resurveyed and the corners established as near as our imperfect instruments will permit. A careful and systematic survey of the farm is really needed to establish our exterior lines, and the dividing lines of the fields, since old land marks rapidly decay. Unless this work is done in a short time it will be a matter of great trouble and expense. If the farm is ever devoted to experiments to any great extent an accurate survey is absolutely necessary.

With the assistance of a student, I constructed a much needed spherical black board at a cost to the College of 43 hours' work at ten cents per hour, a few nails, a few pounds of cement, and four rejected castors, altogether not exceeding six dollars.

Under my directions the bridge over Red Cedar river has been covered with a coat of crude petroleum for a preservative purpose.

I took part in the exercises of two of the Farmers' Institutes last January, and delivered an additional lecture at Jonesville.

I have lectured twice before the faculty and students of the College, as is shown in the faculty report.

Many of our instruments have been incidentally mentioned in the body of the report, and it is only necessary to call attention especially to those needed. First of all, we need an instrument that can be used in accurate surveying; in other words, a first class engineering transit. Such an instrument will cost \$220 00.

We also need a steel tape for accurate measurement, and several additional chains for class use, costing not to exceed \$50 00.

For class use a good sextant is urgently needed; a small one can be purchased for \$50 00.

In the model museum are nearly 7000 working models of inventions, a present from the Patent Office at Washington, crowded into twenty-two small cases. This grouping or rather "piling" is such as to destroy in a great measure the value of the collection, and additional cases are urgently needed. The cost of the cases needed will be \$125 00.

The two middle piers of the Cedar River bridge should each be guarded by an ice breaker on the up-stream side. The appropriation of the last Legislature of \$800 00 for the building of this bridge was barely sufficient for its construction. One contractor only would bid for the work, most of them regarded the amount as altogether too small for the building of 125 feet of bridge, and the structure erected was the best possible under the circumstances. The two ice breakers can be constructed for \$100 00 each.

It appears to me desirable for the College to possess a set of wood engraver's tools. Much engraving that is now, either not done, or done at considerable expense for the report, could be done with much less cost at the College. A set of tools would cost \$75 00.

Very respectfully submitted.

R. C. CARPENTER.

STATE AGRICULTURAL COLLEGE, }
Lansing, Mich., Sept. 30, 1876. }

REPORT OF THE FARM DEPARTMENT.

To the President of the Michigan State Agricultural College:

The Farm Department would respectfully submit the following report for ten months, viz.: from Dec., 1, 1875, to Sept. 30, 1876, inclusive. The matter contained in this report must of necessity be very incomplete, as it is impossible to close the year at this date and make reliable and close estimates, with many of the crops unharvested, as roots, corn and potatoes still growing in the field or standing in the stook, and with oats and wheat unthreshed in the barn or stack. With this preface and your consideration of these things, I proceed:

The year in many respects has been a peculiar one in this locality. The spring opened with the fall of quite a heavy body of snow, which melted rapidly, and perfectly saturated the soil with water. Added to this were frequent and heavy rains during the most of April and the first part of May. It was very difficult to get upon the fields with teams, and plowing most of the time was out of the question. This, with other causes, delayed the putting in of oats and corn.

The increased acreage in corn from the use of field No. 11 aided in this result, there being 48 acres of corn to prepare ground for, instead of 23 acres, the usual amount. From May 15th to June 15th was a time of comparative drouth. Then there were frequent rains until July 6th. These were followed by a severe and protracted drouth, which has injured the corn, roots, and potatoes very much. For a closer inspection of the peculiarities of the season, I refer you to the meteorological report of Professor R. C. Kedzie. The various fields were planted to crops this year according to the plan submitted in the Farm Report for Dec. 1, 1875,—field No. 9 being then already sown to wheat.

Before commencing the history of the fields, I wish to call attention to the statement of farm receipts and disbursements, as reported by the Secretary.

In this statement the farm is charged with student labor, an aggregate of 28,947 hours, costing \$2,819.32. This has been disposed of as follows:

Labor performed outside the department:

College account, 9,445½ hours, @ .0973 +	\$918 48
Cash received and bills receivable, 841¼ hours, @ 10 cts. per hour..	84 13

Labor performed in the department:

Field and other accounts, 18,660½ hours, @ .09735 +	1,816 71
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Total, 28,947 hours—costing	<u>\$2,819 32</u>
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The labor on the farm department was disposed of as follows:

Field No. 1	\$6 74
No. 2	3 89
No. 3	82 70
No. 4	12 27
No. 5	43 84
No. 6	144 15
No. 7	284 41
No. 8	37 16
No. 9	47 70

Field No. 10.....	\$170 02
No. 11. (Formerly with Nos. 13 and 15).....	184 13
Nos. 12 and 14 (combined).....	1 17
Nos. 13 and 15 (combined).....	17 71
No. 16. (Timber, south side of farm).....	160 89
Stock account.....	280 91
Cattle barn account.....	60 26
Sheep barn account.....	11 33
Horse barn account.....	4 43
Piggery account.....	100 70
Shop account.....	84 32
Compost account.....	39 89
Farm department account.....	19 32
Granary account.....	11 61
Office account.....	7 16

Total disbursements for student labor.....	<u>\$1,816 71</u>
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The men and team labor of the department has cost as follows:

Labor bills for men.....	\$961 73
Board of men.....	493 43
Cost of keeping team (see Horse Barn acct.).....	592 84

Total.....	<u>\$2,048 00</u>
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The labor has been charged to the field or place where used at the rate of 30 cts. per hour, for man and team, or \$3.00 per day of 10 hours.

The distribution of this labor was as follows:

LABOR OUTSIDE THE DEPARTMENT.

College Account.....	\$376 23
Cash receipts for labor performed for individuals.....	86 86
Totals.....	<u>\$463 09</u>

LABOR IN THE DEPARTMENT.

Cattle barn account.....	\$ 313 20
Stock account.....	555 97
Horse barn account.....	32 25
Sheep " ".....	9 00
Shop and implements.....	24 52
Piggery account.....	53 85
Farm department account.....	70 69
Granary.....	60
Field No. 1.....	6 00
No. 2.....	5 52
No. 3.....	168 00
No. 4.....	13 35
No. 5.....	40 70
No. 6.....	141 08
No. 7.....	176 25
No. 8.....	38 77

Field No. 9.....	\$51 52
No. 10.....	157 77
No. 11.....	138 22
No. 12.....	15
Total of men and team labor charged to farm.....	<u>\$1,997 41</u>
Grand total of men and team labor as charged at 30 cts. per hour.	\$2,460 50
Less actual cost.....	<u>2,048 00</u>
Balance.....	<u>\$ 412 50</u>

Showing the actual cost of men and team labor for this year to be twenty-five cents per hour nearly, or about \$2.50 per day.

The fields will be taken up in their regular order.

Field No. 1. East end. This field, $2\frac{2}{3}$ acres, was in meadow, and only one crop of grass was cut. It was mixture of clover and timothy. The grass was cut on June 26th, and drawn on June 29th. The yield was 9,680 lbs. of hay of very fine quality.

Field No. 1, west end, $5\frac{1}{2}$ acres, was used for pasture for calves, and lambs when taken from the ewes. The fence on east side of east end, bordering on the "Marble farm," was relaid, staked and wired at a cost of \$3.06. The field account is

	Dr.	Cr.
To labor in haying.....	\$9 68	
By hay, 4 84-100 tons @ \$8.00.....		\$38 72
To balance.....	29 04	
	<u>\$38 72</u>	<u>\$38 72</u>

The \$3.06 for repairs of fence was charged to permanent improvement.

Field No. 2. This field remains as it was left last year; the press of labor in other places seeming to have required it. Twenty-four loads of compost were drawn and spread on the sandy slope on the west side, and this with twenty-five hours mowing weeds was all the out-lay. The sheep were pastured here a few days in the early part of the season, but no receipts are credited. The account is—

	Dr.	Cr.
To labor.....	\$9 41	
" compost.....	6 00	
By improvement of soil to balance.....		\$15 41
	<u>\$15 41</u>	<u>\$15 41</u>

Field No. 3 was sown with oats. We began plowing east and west on April 21st, with the soil very wet. There was at that time over an acre on the north side of the field submerged. This water settled away quite rapidly, yet not so but that when it was plowed, the water settled in the furrows at each round of the plow. We finished plowing on April 27th, and then harrowed east and west, then planed or smoothed north and south. Then 1,600 lbs. White Schoonen were drilled in on the east side, and 977 lbs. Excelsior oats on the west side of the field, using the Beckwith roller drill. After this the field was thoroughly rolled north

and south. The sowing was begun on April 28th, and finished on May 2d. I find this note, "On May 11th, oats just coming up," thirteen days after sowing the first. The weather had been wet and cold, and on nearly two acres of the lowest ground, the seed probably rotted, as it nearly all failed to grow. Nearly one acre was entirely submerged again for nearly two weeks after sowing. Commenced cutting on July 22d, reaping on the 24th, and finishing on the 29th. On August 3d, finished drawing, having been compelled to mow some parts of the crop, where the oats were badly laid by storms, and rake them with a horse rake. As the crop at this date is but partly threshed, the yield is unknown, (estimated as per inventory, at 600 bushels unthreshed), besides 177 bushels threshed and stored, or fed out. Part of the east fence has been laid over, staked, and wired. The account for the oat crop is this:

	DR.	CR.
To preparation for crop.....	\$68 24	
sowing.....	12 60	
seed.....	24 06	
harvesting.....	60 29	
threshing.....	17 20	
By 760 bush. oats @ 30 cts.....		\$228 00
25 tons straw @ \$4.00.....		100 00
To balance.....	145 61	
	<u>\$328 00</u>	<u>\$328 00</u>

There is charged to this field on permanent improvement, for repair of fence and picking stone, \$5.42. Of this amount, 44 cents is charged to picking stone, and the balance, \$4.98, to repairs of fence.

Field No. 3. Wheat crop. The field was immediately put in process of preparation for wheat. Commenced plowing on August 11th, and finished on the 18th. The field was plowed east and west, followed by harrow in the same direction, then planed north and south, then cultivated with Champion cultivator with drag attachment the same way. At this time we were excavating for, and laying some much needed tile drains, to drain the low places mentioned as having been submerged for some time in April and May. Harrowed again east and west and on Sept. 9 began sowing wheat in the afternoon. It rained before evening, during the night, and nearly all of the next day. Commenced sowing again on the afternoon of the 12th, and on the 13th the work was again stopped on account of rain. On the 16th I found it necessary to cultivate the remainder of the field before sowing, finishing the sowing on Sept. 18th. We used for seed 27 bushels and 57½ lbs. of Clawson wheat and 274½ lbs. of timothy seed, sown at the same time, using a Superior drill, manufactured in Springfield, Ohio, and loaned for the purpose by Messrs. Agard & Harris, of Lansing. The cost of the wheat crop is this:

	DR.	CR.
To preparing ground and sowing.....	\$82 41	
seed wheat.....	31 26	
timothy seed.....	13 77	
labor in seeding timothy.....	20	
By cost of crop and seeding, charged to account of 1877....		\$127 64
	<u>\$127 64</u>	<u>\$127 64</u>

The permanent improvement of the field includes taking out the last stump and picking up some stone at a cost of \$4.34. The cost of wheat on the ground and the seeding to timothy is charged forward to the field for the next year.

Field No. 4. Of this, one acre was already sown to winter rye for binding corn stalks in husking. The remainder was plowed and planted to corn for soiling purposes in drills 30 inches apart. The field was divided into four plats, planted about 10 days apart. The green fodder was cut and fed during the drouth in August and September, and charged in the stock account at cost of production,—\$44.94. No other expenditures were made upon this field. Small fenced plats were used as pasture for hogs and sheep.

Field No. 5. This field was in meadow. Plaster (donated by the Ohio Plaster Company, of Grand Rapids, Mich), at the rate of 50 pounds per acre, was sown, and the field rolled April 25th, as some clover plants were heaved by the frost. We began cutting grass on June 29th, and finished on July 10th. The yield was 43½ tons, or 2 37-68 tons per acre. All was secured in good order, except 25,895 lbs., credited at \$6.00 per ton, and one load of 2,070 lbs., credited at \$2.00 per ton, which amounts were injured by the heavy rains occurring between the 1st and the 6th of July. The field is now in pasture. The main drain for Field No. 3 runs through this field, and the outlet is near the southeast corner. Laying tile was begun on August 8th.

The account is as follows:

	Dr.	Cr.
To labor on field in spring-----	\$6 80	
plaster (freight)-----	93	
labor in hay-----	77 54	
By 58,535 lbs hay @ \$8 00 per ton-----		\$234 14
25,895 lbs. hay @ \$6 00 per ton-----		77 69
2,070 lbs. hay @ \$2 00-----		2 07
To balance-----	228 63	
	<hr/>	<hr/>
	\$313 90	\$313 90

There was 20 cts. repairs of fence, which was charged to permanent improvement.

Field No. 6.—This field, according to the regular rotation, was planted to corn. The clover and timothy sward was turned over and seven loads of compost were spread on a gravel ridge near the center of the field sloping west. We began plowing on April 24 and finished on May 15. Rain hindered much in the preparation of this field. It was harrowed east and west thoroughly with iron harrows, lapped half. Five or six acres on the south side, on account of early plowing and frequent rains, had become so hard and grassy between furrows that it was cultivated east and west. The field was then harrowed southeast and northwest, and again northeast and southwest. The field was then marked for the corn, the rows north and south being 3½ feet apart, and the rows east and west 4 feet apart. The field was planted to the variety of corn known as Yellow Blaze, or "Smut Nose," commencing on May 26. The seed, except that of the last two acres, was soaked in pure water for 48 hours previous to planting. That on the last two acres was soaked only 8 hours. Finished planting on May 29.

It was proposed to try an experiment with two kinds of superphosphate on a portion of this field. The College had previously been donated two tons of

Homestead superphosphate, manufactured by Jarves & Hooper, Detroit, Mich., and also with two bbls. of superphosphate manufactured by Casper Shulte, Detroit, Mich. The south side of the field was selected, and the first 16 rows were planted after having distributed 200 lbs. Homestead superphosphate per acre, as evenly as possible in the hills, and a slight covering of earth put over it with the foot before dropping the corn. The next sixteen rows were planted with no dressing. The third plat of 16 rows was dressed as follows: Eight rows on the south side with 200 lbs. Homestead superphosphate. The eight rows on the north side were dressed with 200 lbs. of Shulte's superphosphate. The fourth plat of 16 rows received no dressing.

As the corn stands in the stook, no result can be known and stated until the completion of the report for Sept. 30, 1877. The field was cultivated east and west, commencing June 5 and immediately crossed, going twice in each row. This was immediately followed by thinning and hand hoeing. In July the corn was cultivated again both ways, reversing the order, cultivating first north and south and then east and west. The experimental corn being somewhat grassy was hoed again.

Commenced cutting corn Sept. 5 and husking the poorer portion of the field to feed fattening hogs. Finished cutting Sept. 11, putting 64 hills of experimental corn and 49 hills of the other corn in a stook. So far as husked the yield is a very light one. The part unhusked was estimated at 800 bushels.

The account of the field is as follows:

	DR.	CR.
To 7 loads compost @ 25 cts.	\$1 75	
preparing for crop.	96 65	
planting.	21 27	
cultivation of crop.	110 04	
seed.	7 17	
labor in harvesting to date.	52 18	
By 321½ bushels @ 30 cts.		\$96 45
800 bushels (estimated) @ 20 cts.		160 00
45 tons stalks (estimated) @ \$1 50.		67 50
11 tons fed out @ \$2 00.		22 00
To balance.	56 89	
	<u>\$345 95</u>	<u>\$345 95</u>

Stone picked and stump roots taken out \$5 09 charged to permanent improvement. No charge was made for the superphosphate used in the experiment.

Field No. 7. This field is being cleared, and in the spring the work was nearly completed. It has been used as woodland pasture.

The account is as follows:

	DR.	CR.
To wood on hand Dec. 1, 1875, (see inventory of that date) ..	\$522 23	
labor on wood (chopping and brushing largely for permanent improvement, but all charged together, as it could not be separated) ..	460 66	
By 72 cords of 4-ft. wood, sold @ \$2.50 per cord.		\$180 00
165 cords 18 inch wood, sold @ \$1.50 per cord.		247 50
122¾ cords of 4 ft. wood, inventoried, @ \$2.20 per cord. ..		270 05

By 70 cords 18-inch wood, inventoried, @ \$1.20 per cord.....	\$84 00	
800 split rails @ \$2.50 per hundred.....	20 00	
64½ cords 3-ft. wood, sold @ \$2.25.....	145 12	
basswood kindlings for hall.....	2 00	
balance on account of permanent improvement.....	34 22	
	<u>\$982 89</u>	<u>\$982 89</u>

Field No. 8.—This field was in meadow this year, for the second year. In 1875 it received 6 quarts of timothy seed per acre after mowing, which was well harrowed in.

On April 24th it received a dressing of 1,200 lbs. of Grand Rapids plaster or about 50 lbs. per acre. On the 21st and 22d days of April it was rolled to help the clover, which was badly heaved in some places by the frost. Subsequent facts showed that the clover was nearly all killed. It was proposed to try an experiment with Homestead superphosphate in grass: so on May 13, the east side of this field was selected as the place, and was separated into two equal plats 16 by 20 rods, of 2 acres each, in the form of a rectangle. The south plat received a dressing of 400 lbs. of Homestead superphosphate (a donation to the College), evenly sown. The north plat received none. Both had previously been dressed with plaster. The grass was cut on July 10 and 11, raked on the same day the cutting was done, well cured in the cock, and drawn by two teams working at the same time on each plat.

The hay was carefully weighed and the result recorded. The south plat yielded 8,110 lbs., while the north one yielded but 6,900; a difference of 1,210 lbs. on 2 acres, or a difference of 605 lbs. per acre in favor of the plat dressed with the superphosphate and plaster, over plaster alone. The south plat yielded at the rate of 2 tons 55 lbs., and the north one at the rate of 1 ton and 1,450 lbs. per acre. The whole field was finished July 22, giving a total yield of 87,270 lbs., or 43 tons and 1,270 lbs. on 23½ acres. This shows a yield of 1 17-20 tons per acre, average on the whole field. The account with the field is:

	Dr.	Cr.
To Labor in haying.....	\$75 93	
freight on plaster and phosphate.....	1 49	
By 43 63-100 tons hay @ \$8 00.....		\$356 22
To balance.....	278 80	
	<u>\$356 22</u>	<u>\$356 22</u>

Field No. 9 was already sown to wheat when the year commenced, and seeded to timothy (as per last Report) at a cost of \$159 64 for sowing, and \$20 75 for seeding to timothy. The field was sown on April 21, with 6 lbs. of clover seed per acre. The west ¾ of the field was harrowed north and south with iron tooth harrow once in a place, except two low, wet places which were partly filled with standing water. This was on April 24, 25 and 26. The field was then rolled on April 26, 27 and 28, east and west. On May 2 the field received a dressing of 800 lbs. Grand Rapids plaster, or about 33½ lbs. per acre. On May 13, a plat 8x20 rods in the northwest corner of the field (Clawson wheat) received a dressing of 200 lbs. of Homestead superphosphate. This wheat looked better than the other after it, and I am confident yielded somewhat more; but on

account of the variable conditions of the treatment of various parts of the field, as well as the unequal stand of the grain, no definite result or comparison could be reached.

The wheat suffered severely from the frequent freezing and thawing of the open winter, as in this locality the ground was free from frost three times during the winter. The Asiatic and Diehl varieties suffered most. We commenced cutting wheat on July 11th, on the 12th began reaping, and cut the Week's wheat and Asiatic, on the 13th cut the Gold Medal variety, and finished the same week. Began drawing on the 17th, and finished on July 21st.

The Asiatic, Gold Medal, and Clawson varieties have been threshed, and yielded respectively $7\frac{1}{2}$, 15, and $17\frac{1}{2}$ bushels per acre. The Asiatic was badly shrunk, and the Clawson somewhat so. The Gold Medal was very plump and nice. One inference can fairly be drawn from the treatment of the field, and that is, that the wheat seemed to withstand the severity of the winter the best where the ground was not rolled in the fall. One trial, however, does not make a general rule.

The wheat threshed weighs as follows: Gold Medal, 60 $\frac{3}{4}$ lbs.; Clawson, 58 $\frac{3}{4}$ lbs., and the Asiatic wheat, 54 $\frac{1}{2}$ lbs. per bushel by measure.

Seed of each of these three varieties has been sown on the farm the present year for the crop of 1877. This field is now being pastured with yearlings on account of the large growth the timothy attained.

The summary is this:

	Dr.	Cr.
To labor in threshing out crop, '75.....	\$38 39	
" on this year's wheat crop.....	60 83	
cost of sown crop.....	159 64	
" seeding to timothy.....	20 75	
clover-seed (cost of seed).....	18 67	
dressing of plaster, etc.....	1 66	
By account of last year's crop.....		\$38 39
350 bushels wheat (estimated @ \$1 00).....		350 00
24 tons straw @ \$3 00.....		72 00
To balance.....	160 45	
	<u>\$460 39</u>	<u>\$460 39</u>

Field No. 10. *Potatoes.* This field was divided, and five acres from the north side were planted to potatoes, while the remainder of the field, 17 acres, was sown to roots. Began to plow for potatoes on May 15, 112 loads of compost having been drawn and spread on the ground before plowing. Harrowed the ground east and west, and marked the rows three feet apart, running a light shovel plow to make a furrow, in which the potatoes were dropped and covered by hand.

The seed was mostly of medium size, and usually a potato was cut in three or four pieces, two pieces being used in a hill. The rows only run one way, and hills were from 2 to 2 $\frac{1}{2}$ feet apart in the rows. Rains hindered the work greatly, so that on May 30th we were only through planting.

As soon as the potatoes were up the ground was harrowed east and west, to keep back the weeds. On June 28th cultivated them twice in a row, and on June 29th finished hoeing for the first time. They were cultivated again on July

14th, once in a row, and hoed again. Four pounds of Paris green in two different applications, about three weeks apart, used with water and a sprinkler, kept the field almost entirely clear of the Colorado Potato Beetle. On August 10th the first potatoes were dug, and the quality was found to be poor, the potatoes small. The division of the five acres was about as follows: One acre Early Rose; about one and three-quarter acres Extra Early Vermont; one-quarter acre of small plats of Brownell's Beauty, Compton's Surprise, and Snowflake; two acres, or the remainder, to Peachblows. The Extra Early Vermont did the best of the early varieties, and the Brownell's Beauty, apparently, of the later ones.

A blight struck the tops about August 1st, and this with the drouth (which was very severe), threatened to destroy the crop entirely. August 10th the Peachblows had just began to set, and it is due to the lateness of frost and prevalence of warm weather, that we have any late potatoes at all. The piece has yielded about 50 bushels per acre as far as harvested. The Peachblows growing are estimated at \$62 50 per acre.

Account for the five acres as follows:

	Dr.	Cr.
To preparing for crop.....	\$78 24	
compost, 112 loads @ 25c.....	28 00	
planting.....	2 43	
seed.....	12 97	
cultivation.....	24 65	
Paris green.....	2 00	
harvesting.....	18 14	
By potatoes as per inventory.....		\$175 00
“ sold.....		48 46
To balance.....	57 03	
	<u>\$223 46</u>	<u>\$223 46</u>

Field No. 10, Roots.—We began plowing east and west for roots on June 3d, followed by harrow in the same direction. This field was then cultivated east and west by wheel cultivators and immediately crossed north and south.

On July 17th commenced planing north and south, and after completing the field in this direction crossed it east and west to smooth down the surface. On afternoon of July 18th begun sowing the turnip seed (yellow ruta-baga) in drills 30 inches apart. The seed was purchased of the Detroit Seed Co., Detroit, Mich., and 25 lbs. were used on the 17 acres. Finished sowing on July 20th. Most of the seed came up very quick, and on August 7th began cultivating them once in a row. The same day distributed Homestead superphosphate on the south side of the field. Began hoeing and thinning the roots to ten inches in the rows on August 8th and finished on August 17th. The stand of plants on the field was very even and fine.

On August 24th began cultivating the second time, twice in a row, and on August 28th finished. September 2d began hoeing the second time and finished on September 30th. There is no perceptible difference at this date in the roots which were dressed with superphosphate and those which were not dressed, either as to appearance or size.

The account of the root crop is this:

	Dr.	Cr.
To preparing ground	\$98 94	
27 loads compost, @ 25c	6 75	
sowing	4 29	
seed	7 37	
cultivation of crop	90 10	
By 17 acres turnips, @ \$30		\$510 00
To balance	302 55	
	<u>\$510 00</u>	<u>\$510 00</u>

Stone were picked from the field during the preparation for this crop, at a cost of \$10 12, which expense is charged to permanent improvements. Adding the gain on potatoes (5 acres) to the gain on roots (17 acres) gives us a total of \$359 58.

Field No. 11. Fields No. 11, 13, and 15, in 1875 comprised one large field used as woodland pasture, and all was known as No. 11. This year No. 11 proper was fenced off ($23\frac{2}{3}$ acres) and Nos. 13 and 15 left as before, in one field. Much labor in stumping and logging was done in 1875 to prepare the field for a crop; but considerable work remained to be done.

The surface on the east part of the field was very rough and stumpy. Began plowing with the oxen on May 15th and finished the field on the 28th. On the 26th of May commenced harrowing east and west with drag lapped half. Harrowed a second time northeast and southwest, and then marked the field; the rows east and west $3\frac{1}{2}$ feet apart; the rows north and south 4 feet apart. Planted the field on June 2d and 3d; the north half of the field to yellow blaze, and the south half to yellow dent. The field contains about four acres of swamp that was cleared, and partly drained in the latter part of the season. The field in-corn was nearly twenty acres.

On June 29th finished cultivating twice in a row east and west, and immediately crossed it cultivating twice in a row. Then followed hand hoeing. July 14th began cultivating the field east and west once in a row, and then cultivated north and south twice in a row. There being some grass on the west side of the field where the headland was left in plowing, the thirty rows on this side of the field were hoed a second time. On September 11th began cutting corn, putting forty-nine hills or equivalents of space in a stook. Finished cutting on the 13th. The crop was estimated.

The crop was injured very much by the wet at first, and then by the severe drought after July 6, that came just at the time when the corn was setting for ears.

The account with the crop is as follows:

	Dr.	Cr.
To preparing for crop	\$84 65	
planting	18 61	
seed	3 66	
cultivation	75 74	
harvesting	18 22	
By 40 tons stalks (estimated) @ 1.50		\$60 00
600 bushels corn (estimated) @ 20 cts.		120 00
loss to balance		20 88
	<u>\$200 88</u>	<u>\$200 88</u>

The account for permanent improvement of this field stands thus:

	Dr.	Cr.
To building fence.....	\$42 39	
chopping and clearing.....	39 96	
ditching.....	42 78	
By 5 cords wood @ 2.20.....		\$11 00
balance, permanent improvement of field.....		114 13
	<u>\$125 13</u>	<u>\$125 13</u>

Field No. 12. This field has been in pasture and includes No. 14, not fenced off. No improvement has been made in this field this year. The old bridge across the "Ditch" has been repaired at a cost of \$1.32.

Field No. 13.—This field includes field No. 15, not fenced. It has been used as pasture. Some ditching and chopping have been done. The account is this:

	Dr.	Cr.
To clearing and cutting wood.....	\$13 53	
ditching.....	4 18	
By 3½ cords wood @ \$2.20.....		\$8 25
permanent improvement to balance.....		9 46
	<u>\$17 71</u>	<u>\$17 71</u>

The Chicago and Northeastern railroad company have this year surveyed and graded their line across the farm, entering on the east side nearly on what will be the division line between Fields No. 13 and 15, crossing the lane from No. 15 to No. 14 and leaving the farm on the west at near the middle of No. 14. They cross the farm without a curve at an angle of south 87° 21' west, cutting through three small swamps, one of which they drain by a ditch. The portion of the farm occupied by this company is 7 30-100 acres.

Field No. 16 includes all south of Nos. 14 and 15, and is all timber. The lane was cleared through to the line of the D., L. & L. M. railroad. The account is this:

	Dr.	Cr.
To labor in clearing.....	\$160 89	
By 35 posts @ 6c.....		\$2 10
62 cords wood @ \$2.20.....		136 40
permanent improvement to balance.....		22 39
	<u>\$160 89</u>	<u>\$160 89</u>

This closes the field accounts for the year. Of the amounts for labor charged to the farm, the sum \$218.22 has been expended for permanent improvement on the farm.

The granary has been charged with the care of the grain, after being deposited there. The account is this:

	Dr.	Cr.
To student labor, cleaning grain.....	\$11 61	
men's " " ".....	60	
By balance charged in labor account.....		\$12 21
	<u>\$12 21</u>	<u>\$12 21</u>

The horse barn has been charged with all the hay and grain consumed by teams; also with all cash disbursements of team account. These include shoeing of horses, repairs of harness, and wagon, and axle grease.

The account stands thus:

	Dr.	Cr.
To 20 tons hay @ \$8.00.....	\$160 00	
180½ bushels corn @ 30 cts.....	54 10	
711 bushels 28 lb. oats @ 30 cts.....	213 58	
bedding.....	40	
student labor.....	4 43	
men and labor.....	32 25	
cash disbursements.....	128 08	
By amount charged to men and team labor.....		\$592 84
	<u>\$592 84</u>	<u>\$592 84</u>

The shop account has been kept for the regular care of tools and repairing. The account is as follows:

	Dr.	Cr.
To care of tools.....	\$56 32	
shop work in repairs.....	52 52	
repairs of implements in town for which cash is paid...	118 46	
By balance, appearing in labor and cash accounts.....		\$227 30
	<u>\$227 30</u>	<u>\$227 30</u>

Of the repairing done by the students I may mention the replacing of old wood of iron frame roller with new, and repairing the iron work.

They also repaired two plows by putting in two beams and one handle.

Framed a set of treads for horse power; put new bottom in wagon box and repaired the irons; moved the interior of the blacksmith shop over to the basement of the brick shop, etc., etc. The blacksmith shop is not in running order as we are minus an anvil on account of the centennial patriotism, and the bellows need repairs.

The office account consists of labor in care of office, copying, etc.:

	Dr.	Cr.
To cost of labor in copying and care of office.....	\$6 48	
moving coal.....	68	
cash disbursements on account of office, consisting of		
stamps, stationery, ink, and postal cards.....	20 00	
By balance, appearing in cash and labor accounts.....		\$27 16
	<u>\$27 16</u>	<u>\$27 16</u>

Compost.—This account is for labor in forking and shoveling over. The labor was all performed by students at a cost of \$39.89, which has increased the value of the remaining 1,000 cubic yards to nearly 30 cents per cubic yard.

The farm department, or miscellaneous account, includes labor in a variety of places that is not directly chargeable to other accounts, as repairs of barn and bull yard fence; repairs at bridge; repairs of fence and gate of triangular field, which was used as pasture for the cows of several of the Professors; teaming to town for the department, and in marketing wheat, etc.

The summary is this:

	Dr.	Cr.
To men and team labor.....	\$70 69	
student' labor.....	19 32	
By cash receipts of labor.....		\$2 70
expenditures, labor account.....		87 31
	<u>\$90 01</u>	<u>\$90 01</u>

The Sheep Barn has been charged with all the labor in care and feed to sheep. The account is as follows:

	Dr.	Cr.
To inventory of sheep, Dec. 1, 1875.....	\$782 50	
" " wool, 824½ lbs. @ 40c.....	329 70	
expenditure, student labor.....	11 33	
" men and team labor.....	9 00	
produce consumed.....	281 50	
By inventory of sheep, Sept. 30, 1876.....		\$744 00
receipts of wool sold, crop 1875, as per inventory, (net returns).....		232 32
receipts of wool crop of 1876, 871 lbs. 9 ozs., (net returns).....		198 10
sheep sold.....		15 00
use of rams.....		4 00
pelts sold.....		10 00
mutton sold.....		6 73
100 loads manure @ 50c.....		50 00
loss to balance.....		153 88
	<u>\$1,414 03</u>	<u>\$1,414 03</u>

The loss in the sheep account is only a very slight one, as the falling off in the price of sheep and wool shows a loss on the inventoried wool of crop of 1875, and also a loss on inventory when the flock was really larger in numbers.

The loss on wool was.....	\$97 38
" " " inventory was.....	38 50
Total.....	<u>\$135 88</u>

Loss to balance in account above, \$153 88, showing a real loss of \$18 00 for the year.

The flock was sheared earlier than usual this year, so that the year's wool clip only represents 11½ months' growth. The shearing was done on May 16th to 18th, and the various divisions of the flock sheared as follows:

Pure Merinos,—			
5 rams average.....	13 lbs., 2	2-5 oz.	
13 ewes average.....	7 " 5	12-13 "	
average of pure Merinos.....	9 " 0	2-9 "	
Black-faced Highland sheep,—			
2 pair average.....	4 " 7½	"	

Cotswold, pure,—			
1 ram.....	9 lbs.	4	oz.
South Down, pure,—			
2 rams average.....	6	“ 13	“
23 ewes average.....	5	“ 8 15-23	“
Average of all South Downs.....	5	“ 10 7-25	“
The grade sheep sheared as follows:			
11 South Down grades average.....	5	“ 15 9-11	“
23 Cotswold grades average.....	8	“ 12 12-23	“
33 Merino grades average.....	8	“ 3 61-66	“
Total 115 sheep average.....	7	“ 9 6-23	“

The cattle barn account is charged with the hay, cornstalks, straw, and turnips fed during the year, also with the grain fed to the stock.

The account is this:

	DR.	CR.
To produce consumed.....	\$1,229 41	
labor performed in drawing and preparing feed.....	373 46	
By amount charged to stock.....		\$1,602 87
	<u>\$1,602 87</u>	<u>\$1,602 87</u>

The turnips were buried in Field No. 3, and the cornstalks stacked in the same field. The labor of drawing them from this field to the cattle barn was charged to the cattle barn account, and then charged forward to the stock account.

The piggery account for the year stands thus:

	DR.	CR.
To stock as per inventory Dec. 1, 1875.....	\$495 00	
labor in care.....	154 55	
feed consumed.....	325 43	
50 pigs purchased, @ \$5.00.....	250 00	
1 boar.....	20 00	
By stock on hand Sept. 30, 1876, (inventory).....		\$612 50
cash receipts of breeding hogs sold.....		129 50
fat hogs sold, (48 @ \$5.75 per cwt.) net.....		613 00
Balance.....	110 02	
	<u>\$1,355 00</u>	<u>\$1,355 00</u>

There remains to be paid a bill of \$80.00 from the Boarding Hall for swill, which has not yet been presented. If presented it would have reduced the profit to \$30.02.

There was an experiment in feeding pigs as follows. Fifty pure Essex pigs were purchased Dec. 1st, 1875, and kept in good thrifty growing condition till September 5th, 1876, when they were started to fatten by giving all the soft corn they could eat, together with cooked potatoes and mill-feed mixed. On September 26th, forty-eight were sold as per account, netting \$613.00. The account of the keeping of these pigs and the result by sale is as follows:

	Dr.	Cr.
To 50 pigs (weight average 42 lbs.) @ \$5.00-----	\$250 00	
freight from Fishers-----	10 00	
mill-feed-----	58 98	
corn from crib, crop '75, 308.3 bush. @ 30 cts.-----	92 49	
men and team labor-----	26 93	
student labor in care-----	50 35	
potatoes @ 15c, crop of '75 (@ 25c crop of '76)-----	22 46	
straw for bedding-----	3 00	
wood for cooking-----	2 25	
corn 303.5 bush. crop '76 @ 30-----	91 05	
By 48 hogs, average 230 lbs. @ \$5.75 (netted) less freight and expenses-----		\$613 00
2 retained, average 230 lbs., @ 5.75-----		26 45
balance-----	31 94	
	<u>\$639 45</u>	<u>\$639 45</u>

The quality of the corn of the crop of '75 was poor; but no charge for swill consumed is made, as there is no means of knowing how much they consumed. If we let the swill consumed offset against the poor quality of the corn, the account will stand as above. The mill feed was purchased at a mean price of about \$15 per ton for bran and \$25 per ton for middlings.

The stock (cattle) account is as follows:

	Dr.	Cr.
To stock inventory Dec. 1, 1875-----	\$8,740 00	
labor in care, etc.-----	836 88	
disbursements, cash on account of-----	442 88	
amount from cattle barn acc't-----	1,602 87	
cost of soiling crop in field No. 4-----	44 94	
By stock inventory Sept. 30, 1876-----		\$9,530 00
breeding cattle sold-----		341 00
beef cattle and hides sold-----		225 39
use of bulls-----		102 50
feed to other stock (cash credit)-----		25 00
400 loads manure @ 50 cts.-----		200 00
milk and butter sold-----		738 40
balance, apparent loss-----		505 28
	<u>\$11,667 57</u>	<u>\$11,667 57</u>

The inventory of Sept. 30th lowered the stated value of the stock \$500 below that of Dec. 1, 1875.

These animals, if inventoried as high as on Dec. 1, 1875, would bring the balance down to \$5.28.

The loss in the above account is apparent only, as the stock has been charged with nearly all the dry feed for a year, while on the other hand we have only 10 months of milk receipts to balance. This, taking September's receipts as a basis for calculation, would give us \$260.00 more from milk, at the least, during the months of October and November, with a very small outlay, and would

give us for the year a profit of \$200.00 at least, if the account were to continue open for the full year, or to Dec. 1st.

The College account includes all labor performed for the College in improvement of grounds, draining, etc., etc., not included in regular farm labor, and hence not included in the Farm Department regular account. The amount appears as Bills Receivable in the Secretary's Report of farm receipts and disbursements. In the early part of the year a system of drains was suryed on the lawns near the new houses. These drains were 6,281 feet in continuous length using as an outlet, an old four inch drain that was laid in the old pear orchard, and which reached the river through the low ground and a small ravine south of the new houses.

The cost was as follows:

Tile.....	\$74 59
Labor.....	425 01
Crock for Silt basin.....	1 00
Brick and cement.....	75
Lumber for box.....	30
	<hr/>
	\$501 65
	<hr/>

The grading was carried on near the new houses and the President's house at a cost of labor for the year of \$450.97. For compost drawn, 60 loads costing \$15.00, the labor of drawing and spreading being charged in with the above labor. Total expense, \$465.97.

There was expended in 1875 \$210.91 for the same object, making a total of \$676.88 expended on the grade to Sept. 30, 1876.

The portion north of the barns was sown to wheat, the seed being charged to the College account, and the College account credited with the area sown at \$10 per acre.

The front drain (350 ft.) is laid from the base of the hill in the road, and is for the purpose of carrying off the surplus water of that slope without having an open gutter. The water is to run into a silt-basin or trap with an opening east, into a well that is filled with loose stones, for the purpose of catching any loose dirt that may wash down and thus prevent the stopping up of the drain.

The cost is this:

350 feet 5 inch tile, @ $3\frac{3}{4}$ cents.....	\$13 13
Crock.....	1 68
Lumber.....	30
Brick and cement.....	1 00
Labor (includes stone outlet).....	18 60
	<hr/>
	\$34 71
	<hr/>

The cost of the drains in fields No. 3 and 5 belongs to the College account. These drains are not completed, but when completed will measure of continuous length, 4,185 feet, of which 965 feet consists of a six inch main drain, which can be used for more drainage in both fields by simply continuing the laterals from joints already laid in.

The cost to date is this:

DEPARTMENT REPORTS.

145

Labor.....	\$179 14
Tile.....	99 14
Crock for basin.....	1 68
Brick and cement.....	75
Cement for outlet.....	50
Lumber.....	30
Total.....	<u>\$281 51</u>

There remains now 1,065 feet to be laid in, and 400 feet more of tile to purchase at a cost of \$4.50. The labor will cost about \$30.00, thus making a cost of \$316.01 when completed. It is expected to complete the drain by Oct. 20, at farthest.

The walk at the new houses is being built and will probably be completed by Oct. 15. Cost to date is as follows:

Labor.....	\$4 09
Lumber.....	77 40
Nails.....	4 00
Total.....	<u>\$85 49</u>

Some labor in grading was done before the walk was laid, and charged to the grade.

A new fence, 160 rods in length, was built along the road, commencing at the west boundary of the farm and extending to near the north entrance.

The grading, where the fence was put through the point of the hill, was charged to the grade. The excavation for the fence was charged to the fence. The cost of construction is as follows:

Lumber.....	\$98 88
330 posts, @ 17c.....	56 10
Nails.....	10 13
Labor.....	127 94
Total.....	<u>\$293 05</u>

The sewer at the President's house became clogged and was taken up and put down again at a cost of—

Labor.....	\$5 38
Lumber.....	28
Cement.....	30
Total.....	<u>\$5 96</u>

The large drain under the lawn which was laid in 1873, gave out in two places during the high water in the spring. Seven of the 18 inch "B" sewer pipe were broken and had to be replaced at a cost of—

7 pipes, @ 1.68.....	\$11 76
Labor.....	11 05
Total.....	<u>\$22 81</u>

The old hall basement was ordered to be cleared, preparatory to general examination and repairs of foundation, etc. The work is still going on.

The cost to date is \$4.67.

The remaining parts of the College account consist of small amounts of labor performed at the Chemical Laboratory, on the lawns, and drives, of repairs of brick shop and various gates, etc., etc. The hay received from the lawns has been credited and the amount received applied to the cost of keeping them and the drives in order.

The work on the department has been very satisfactory during the present year. It is believed that better and more work has been performed than ever before, and that the standard of labor has been gradually elevated.

The plan of having members of the Senior class act as sub-foremen, and have the responsibility of some job which they could complete, has worked very well. It has been instructive to them in teaching them how to handle and control, not only their own movements, in labor, but those of others. On the whole the working of the plan has exceeded my expectations. The general plan of farm operations for the remainder of this year and next will be nearly as follows:

Field No. 1.—To remain in pasture the remainder of this year, to be plowed for soiling crop in 1877.

Field No. 2.—To remain as at present till 1877, then to be replowed and some hoed crop put in; perhaps potatoes and corn.

Field No. 3.—Is already sown to wheat and seeded to timothy. To seed with clover in spring of 1877, and harvest the wheat.

Field No. 4.—To be sown with winter rye, and seeded. The rye to be used for early soiling feed. This refers to the part plowed up at present. The remainder to be pastured this year, and plowed up in 1877, and used for two years following for various soiling crops.

Field No. 5.—To be in pasture the remainder of this year and next.

Field No. 6.—To have the corn crop of 1876 first secured, and then to be sown with roots in 1877.

Field No. 7.—Woodland pasture the same as now for this year and next. To proceed with the clearing in 1877.

Field No. 8.—To be pastured the remainder of this year, and sward broken and corn put in for next year.

Field No. 9. Idle the remainder of this year to let the new seeding get good root. Meadow next year.

Field No. 10. The root crop, and the remainder of the potatoe crop is first to be harvested, and in 1877 the field is to be sown to oats, followed by wheat.

Field No. 11. To have the corn crop of '76 first secured, and in 1877 to be planted again to corn in order the better to subdue the eastern portion of the field.

Fields No. 12 and 14 combined. Pasture in 1876-7; perhaps the two fields will be separated by fence.

Fields No. 13 and 15 combined. To be used as pasture in 1876-7, and considerable cleaning and logging done to improve the field. Also, further ditching of the swamps.

Field No. 16. To be fenced on the east side next spring as far as the D., L. & L. M. R. R., if possible.

River Field, east of No. 7. To proceed with clearing as soon as No. 7 is finished.

The rotation of crops practiced upon the College farm is as follows, com-

mencing with pasture plowed up: 1st year, corn; 2d year, roots; 3d year, oats, harvested, and the ground sown to winter wheat, the land seeded with timothy; 4th year, the land seeded with clover, in addition, and the wheat harvested; 5th year, meadow; 6th year, pasture.

The fields now in this rotation are: No. 6, corn; No. 10, roots; No. 3, oats, followed by wheat; No. 9, wheat harvested; No. 5, meadow; No. 8, pasture. The rotation was varied slightly in the case of No. 8, as it was mown as per experiment in the history of the field, and then pastured afterward. Fields No. 1, 2, 4 and 11 of the plowed fields have not been placed in the rotation as yet. The remaining fields will be brought under cultivation as soon as practicable, and into the rotation as soon after as will be feasible from the amount of clearing that must be done.

In regard to the stock, I recommend the purchase of another Cotswold ram, and also of an Ayershire and a Devon bull, of new strains of blood for breeding purposes. The year after, means must be taken to secure another Short Horn bull. The farm department has received presents, beside those heretofore acknowledged, of a fine Merino ram from the flock of Mr. G. W. Phillips, a member of the State Board of Agriculture; a Gale Plow, complete, from the Gale Manufacturing Co.; a "Wolverine" plow, from the Ann Arbor Agricultural Works; one-half price of Challenge Feed Mill, from the Challenge Mill Co., Batavia, Ill.; a triangular hoe, from a firm in Otsego; a set of cultivator teeth for Champion Cultivator, and one-half price of the Cultivator, of Latta & Shupe, Battle Creek, Mich.

The farm departments are also under obligation to Prof. Carpenter for valuable assistance in the laying out and platting of drains, beside the compilation of valuable records pertaining to the farm and drains in a single volume to be kept for future reference, and additional records from time to time as shall be necessary.

For the result of the general working of the department as regards profits, etc., I refer you to the Secretary's report of farm receipts and expenditures, showing a balance in favor of the farm of \$990 18, which, with the difficulties of the season and large amount of outside work, is a very satisfactory record.

The above report I beg leave to submit as the farm department report for the ten months beginning December 1, 1875, and ending September 30, 1876.

Before closing this report I desire to express my high appreciation of the services rendered by the foreman of the farm, Mr. C. L. Ingersoll, in the compiling of this report, and in the discharge of his many and responsible duties. He has exhibited much knowledge, skill and energy, and I shall gladly welcome him to a position of still greater responsibility in the growing department of agriculture in the College.

STATE AGRICULTURAL COLLEGE, }
Lansing, Mich., Sept. 30, 1876. }

A. B. GULLEY,
Prof. of Practical Agriculture.

DONATIONS

TO THE COLLEGE DURING THE YEAR ENDING SEPTEMBER 30, 1876.

DONATIONS TO THE HORTICULTURAL DEPARTMENT.

Box of plants from Washington, D. C., supposed to be from U. S. Department of Agriculture, which contained:

- 1 acacia lophantha.
- 1 acacia sp.
- 2 acacia melanoxydon.
- 2 Acacia armata.
- 1 acacia arabica.
- 1 acacia decurrens.
- 2 Anona reticulata.
- 1 Brachychiton populareum.
- 1 Croton variegata.
- 1 Codiaeum variegatum interruptum.
- 1 Codiaeum variegatum angustifolium.
- 1 Eucalyptus globulus.
- 1 Eucalyptus sp.
- 3 Jasminum sambac.
- 2 Macaya bella.
- 11 Phoenix dactylifera.
- 10 Pandanus utilis.
- 3 Thea Bohea.
- 3 Tamarindus Indica.
- 1 Rivina Humilis.

By E. MOSHER, Holly, Mich.:

Mosher's Hand Seed Drill.

By SUTTON & SONS, Reading, England:

Packages of the following seeds:—Yellow lupine; Rope or cole. Sutton's Perennial Rye Grass, Chinese Sugar Cane, Annual Rye Grass, Yellow Trefoil, Creeping Bent Grass, Perennial Rye Grass, Sutton's Improved Italian Rye Grass, Dutch Blue Lupine, Yellow Oat Grass, Milled Sanfoin, Sutton's Hybrid Giant Cow Clover, Lucerne; Potato seed,—Perennial Red clover, Bird's Foot Trefoil, French Furze, Yellow Suckling Clover, Alsike Clover, Quarantain Maize, Yellow Maize, African White Maize, Red Maize, Large Red Maize, New Mottled African Maize, Blue Maize, African Yellow Maize, Dark Salt Lake Maize, Blue and White Mottled Maize, Negro Maize, Salt Lake pop Maize, Striped Syreman Maize.

By T. H. BURGESS, Highland, N. Y. :

- 4 doz. Matilda Strawberry.
- 1 " Col. Cheney Strawberry.
- 3 " Monarch of the West Strawberry.
- 3 " Duncan Strawberry
- 1 " Brandywine Raspberry.
- $\frac{1}{2}$ " Turner Raspberry.
- 1 " Naomi Raspberry.

By CHARLES E. ROBINSON, Battle Creek, Mich. :

- 100 Plants of Philadelphia Raspberry.
- 25 Plants of Clark Raspberry.

By H. A. ATKINS, Locke, Michigan :

- 2 Plants of Jeffersonia diphylla.
- Seeds of Bean of Dolichos Lablab.

By T. T. LYON, South Haven, Michigan :

- 12 Plants of each of six new Strawberries.

By MILLS, PECK & Co, Otsego, Mich. :

- 2 Champion hoes.

By WM. SANDERS, London, Canada :

- 1 Hybrid Raspberry, No. 71 $\frac{1}{2}$.
- 1 Hybrid Raspberry, No. 57.

By FRANK R. HOLLOWAY, Muscatine, Iowa :

- Bulbs of Wild Anemone.

By BUSSEY INSTITUTE, Jamaica Plain, Mass. :

- Small plants of *Larix leptolepis*, *Pinus Banksiana*, *Pinus resinosa*, *Pinus toeda*, *Abies Douglasii*, *Pinus inops*, *Abies Engelmannii*, *Cupressus thyoides*, *Abies alba*, *Rhododendron Catawbiensis*, *Berberis aquifolium*, *Carya sulcata*, *Fraxinus pubescens*, *Eleagnus parvifolia*, *Celtis occidentalis*, *Vitis cordifolia*, *Prinus verticillati*, *Zanthoxylum Americanum*, *Tecoma radicans*, *Crataegus oxyacantha* var. *Siberica*, *Clethra acuminata*, *Castanea pumilla*, *Quercus coccis*, *Quercus Catesbeii*, *Genista tinctoria*, *Fraxinus anomala*, *Hypericum proliferum*, *Amorpha frutescens*, *Rhamnus lanceolatus*, *Nyssa multiflora*, *Carpinus Duinensis*, *Morus Nigra*, *Aguilegia Chrysantha*, *Acer platanoides*, *Fraxinus arnus*, *Lonicera* sp., *Prunus Chicasa*, *Cornus pubescens*, *Crataegus tomentosa*, *Andromeda masciana*.

By DEPARTMENT OF AGRICULTURE :

- 1 sack peas—Champion of England ; 1 sack peas—Curtis' Extra Early Premium Gem ; 1 sack peas—McLane's Little Gem ; 1 sack beans—Dwarf Black Wax ; 1 sack beans—Early Mohawk ; 1 sack beans—Horticultural Pole ; 1 sack corn—Twelve Rowed ; 1 sack corn—Stowel's Evergreen ; 1 paper cauliflower—early Paris ; 1 paper Leek—Extra Large Carentan ; 1 paper egg plant—New York Improved ; 1 paper endive—White Curled ; 1 paper kale—Dwarf German ; 1 paper pepper—Large Bell ; 1 paper spinach—Broad Flanders ; 1 paper salsify ; 1 paper parsley—Double Curled ; 1 paper celery—Boston Market ; 1 paper celery—Large White Solid ; 1 paper onion—Pale Red French Strausburg ; 1 paper onion—White Extra Early Nocora ; 1 paper squash—Improved Marrow ; 1 paper squash—Early Bush ; 1 paper rhubarb—Prince Albert ; 1 paper rhubarb—Mammoth ; 1 paper lettuce—White Cabbage ; 1 paper lettuce—Grand Admiral ; 1 paper tomato—Arlington ; 1 paper tomato—Improved Trophy ; 1 paper parsnip—Fine Sugar—1 paper parsnip—Guernsey ; 1 paper cucumber—Long Green ;

1 paper cucumber—Early White Spine; 1 paper turnip—Large White Globe; 1 paper asparagus—Conover's Colossal; 1 paper asparagus—Dutch Purple; 1 paper asparagus—Cayenne.

DONATIONS TO THE FARM DEPARTMENT.

By DEPARTMENT OF AGRICULTURE:

Eight sacks Spring Wheat—Arwautka; 8 sacks Oats—Waterloo White; 4 sacks Barley—Probstein; 4 sacks Corn—Maryland Yellow; 4 sacks Sugar Beet—White Silesian Red Top; 4 sacks Mangel-Wurzel—Long Red; 1 paper Pumpkin—Large Cheese; 1 paper Beet—Egyptian Turnip; 1 paper Beet, Carter's Perfection; 1 paper Melon, or Cassaba; 1 paper Melon—Skillman's Netted; 1 paper Watermelon—Ice Cream; 1 paper Turnip—Yellow Ruta-baga.

DONATIONS TO THE LIBRARY.

By DEPARTMENT OF INTERIOR, U. S.:

U. S. Geological Survey, vol. 11, 1875; Reviser of Indian Treaties, 1873; U. S. Geological Survey, Hayden, 1869, 1870, 1871; Bulletin of U. S. Geological Survey, No. 5, 2d series; Bulletin of National Museum, Nos. and 2.

By BUREAU OF EDUCATION, U. S.:

Report of Commissioner of Education, 1874; Circulars of Information, Nos. 3, 4, 5, 6, 7 and 8, 1875.

By TREASURY DEPARTMENT, U. S.:

Quarterly Report of Bureau of Statistics; Monthly reports of Commerce and Navigation, Index.

By SUPERINTENDENT OF U. S. NAVAL OBSERVATORY, Washington, D. C.:

Meteorological Observations, 1873.

By SECRETARY OF STATE, Michigan:

Public Acts, 1875; Local Acts, 1875; State Census, 1874; Joint Documents, 1875, 1, 3.

By STATE LIBRARIAN, Michigan:

United States Statutes, 1874, 1875; Michigan Court Reports, vol. 29.

By Hon. T. W. FERRY:

Report of Department of Agriculture, 1873, 1874.

By SUPERINTENDENT OF PUBLIC INSTRUCTION, Michigan:

Report, 1874; School Laws, 1873.

By COMMISSIONER OF RAILROADS, Mich.:

Third Annual Report, 1874.

By SUPERINTENDENT OF REFORM SCHOOL, Mich.:

Nineteenth Annual Report, 1875.

By BUSSEY INSTITUTION, Massachusetts:

Bulletin. Parts 1, 2, 3, and 4, 1874, 1875.

By THOS. JANES, Commissioner of Agriculture, Georgia:

Pamphlet on Sheep Husbandry.
Annual Report, 1875.

By ARKANSAS INDUSTRIAL UNIVERSITY:

Third Annual Report, 1875.

By AMERICAN MISSIONARY SOCIETY:

Twenty-ninth Annual Report, 1875.

By MESSRS SHEEHAN & Co., Publishers:

American College Songster.

By JOHN THOMAS—Thomas, Michigan:

Sinclair's Code of Agriculture.

By S. P. TRACY, Student:

The Mother and her Offspring. By Dr. S. Tracy.

By BOARD OF GEOLOGICAL SURVEY, Pennsylvania:

Second Geological survey of the state of Pennsylvania. Vols. B, D, H, J, and M.

By PRES. T. C. ABBOT:

The Nation. Vols VII., VIII., IX., X., and XI. complete, and various Numbers to complete later volumes.

Report of Ill. Industrial university, 1868, 1869, 1871, 1872, 1873, 1874.

By N. Y. STATE AGRICULTURAL SOCIETY:

Transactions, 1871.

By PROF. A. J. COOK:

The Nation, Vols. XII., XIII., XIV., XV., XVI., XVII., XVIII., XIX., XX., nearly complete; Injurious Insects of Michigan.

By PROF. W. J. BEAL:

Winchell's Religious Nature of Savages; Religious Ideas of Barbarous Tribes; Thoughts on Causality; Syllabus of Lectures on Geology; Agency of Icebergs in Champagne Epoch; Unity of the Physical World; Michigan Geography, Geology, etc.; Diagonal System in Physical Features of Michigan; The Climate of Michigan; Isothermals of the Lake Region; Report of Trustees of Syracuse University, 1874; One Hundred Catalogues of Seeds, Plants, Implements, etc., etc.; The Gardener's Monthly, 1875.

By THE FOLLOWING COLLEGES—Catalogues:

Maine State Agricultural College; Tuft's College, Mass.; Mt. Holyoke Seminary, Mass.; Berea College, Ky.; Hampton Institute, Va.; Amherst Agricultural College, Mass.; Delaware College, Delaware.

By PUBLISHERS AND DEALERS:

Sundry Catalogues and Advertising Pamphlets.

By N. J. BOARD OF AGRICULTURE:

Report of 1875.

By PROF. W. J. BEAL:

Introductory Lecture of Prof. Rachel L. Bodley, A. M., of the Woman's Medical College of Pennsylvania.

By HON. GEO. H. DURAND, M. C.:

Report of Department of Agriculture, 1873; Report of Board of Commissioners on Irrigation in California.

By PROF. A. J. COOK:

Swinton's Outlines of General History.

By PROF. GEO. T. FAIRCHILD:

Hart's Composition and Rhetoric.

By BUSSEY INSTITUTION of Harvard College:

Bulletin, Vol. 1, Part V., 1875.

By PROF. R. C. KEDZIE:

Report of Michigan State Board of Health.

By TREASURY DEPARTMENT, U. S.:

Report of Chief of Bureau of Statistics for Quarters Ending Dec. 31st, 1875, and March 31st, 1876.

By PENNSYLVANIA COMMISSIONER of Second Geological Survey:

Report, Vol. A, 1874, 3d.

By PROF. A. J. COOK:

Manual of Bee-keeping—Pamphlet.

By IOWA BOARD OF IMMIGRATION:

Iowa, the Home of Immigrants. Pamphlet.

By SECRETARY OF STATE, Mich.:

Joint Documents, 1874. Vols. 1 and 2.

House Journal, 1875. Vols 1 and 2.

Senate Journal, 1875.

DONATIONS TO THE MUSEUM.

From F. E. SKEELS:

3 specimens of pottery, one chert hatchet, 1 chert chip, 1 Indian hatchet, 1 Indian arrow head, one stone ax.

From CHAS. B. CORYELL:

1 copper spear head (Indian).

From GEO. BRECK:

15 Indian Arrow heads; 1 stone ax; one fossil coral.

From STEPHEN HASCALL:

1 Gossander.

From J. H. LOWELL:

1 Specimen Lepidodendron.

From C. L. KERR:

2 Rattle Snake Rattles.

From HON. S. O. KNAPP:

1 Specimen Calomite.

From RALPH D. SESSIONS:

1 Chert Arrow Head.

From C. C. POTTS:

A Curious Turkey's Egg.

From R. B. McCULLOCH:

Specimen of Bealestema Grandis.

From H. V. CLARK:

12 Arrow Heads; 1 Stone Hatchet; 1 Stone Lurker; 1 Fossil Coral.

From C. F. DAVIS:

3 Specimens Fossil Crenoids; 14 Specimens Fossil Coral; 4 Specimens Brachiopods.

From WM. N. ADSIT:

1 Specimen of Copper Ore.

DONATIONS TO DEPARTMENT OF MATHEMATICS AND CIVIL ENGINEERING.

From THE CLASS OF 1878:

Twenty-one dollars, applied at the request of the donors, on the purchase of a Compass for the College.

SALARIES OF FACULTY AND OTHER OFFICERS OF THE COLLEGE.

Theophilus C. Abbot, LL. D., President, Professor of Mental Philosophy and Logic, \$3,000.

Robert C. Kedzie, A. M., M. D., Professor of Chemistry and Curator of the Laboratory, \$2,000.

George T. Fairchild, A. M., Professor of English Literature and Librarian, \$2,000.

Albert J. Cook, M. S., Professor of Zoölogy and Entomology, and Curator of the General Museum, \$2,000.

William J. Beal, A. M., M. S., Professor of Botany and Horticulture, and Curator of the Botanical Museum, \$2,000.

Robert G. Baird, Secretary, \$1,250.

Alfred B. Gulley, Professor of Practical Agriculture, \$2,000.

Robert F. Kedzie, M. S., Assistant in Chemistry, \$600.

Rolla C. Carpenter, B. S., C. E., Instructor in Mathematics, and Civil Engineering, \$1,000.

Charles W. Garfield, M. S., Foreman of the Gardens, \$600.

Charles L. Ingersoll, B. S., Foreman of the Farm, \$600.

George W. White, Assistant Foreman of the Farm, \$500.

James Cassidy, Gardener, \$600.

James M. Short, Steward, \$700.

FARMERS' INSTITUTES.

At a meeting of the State Board of Agriculture held November 20, 1876, the committee on Institutes made the following report, which was accepted and adopted :

Your committee recommend the holding of Farmers' Institutes during the coming winter as follows :

Greenville, January 16th and 17th.

Traverse City, January 18th and 19th.

Ypsilanti, January 23d and 24th.

Hillsdale, January 25th and 26th.

Owosso, January 29th and 30th.

Lansing, January 31st and February 1st.

Professors and other members of the College Faculty will take part in the above Institutes as follows :

Greenville, Professors Fairchild, Garfield, and Cook.

Traverse City, Secretary Baird, Professors Kedzie and Carpenter.

Ypsilanti, Professor Gulley, President Abbot, and Professor Beal.

Hillsdale, Professor Beal, President Abbot, and Professor Ingersoll.

Owosso, Professors Cook, Gulley, and Fairchild.

Lansing, Professors Kedzie, President Abbot, and Professor Ingersoll.

The report recommended also that the Secretary be requested to attend all the Institutes.

With regard to time, the Institutes were all held as above with the exception of the one at Traverse City, which, for local reasons, was held one day earlier.

As far as practicable, the delegations from the College attended these Institutes in accordance with the recommendation of the Board. Professors Gulley and Carpenter did not attend the Institutes. Secretary Baird and Professor Ingersoll took part with the other members of the delegation at Ypsilanti, and Prof. Beal took the place assigned to Prof. Carpenter at Traverse City. On account of sickness in his family, Prof. Fairchild was unable to attend the Institute at Greenville. He took part, however, in the Institute at Owosso, and Secretary Baird supplied his place at Greenville.

The Institutes were, generally speaking, well attended and a good degree of interest manifested, and the universal expression of those in attendance was that the exercises were exceedingly profitable. At Greenville, Ypsilanti, Hillsdale, and Owosso, there was a very large attendance, the halls in which the meetings were held being filled to their utmost capacity.

Some of the papers read at the Institutes, though not destitute of merit, we have not thought best to publish in this report, while some that are published,

though not the best that might be found on the subjects treated, yet as setting forth the experience and results attained by farmers in our own State, they contribute to make the report more distinctively what it should be,—a report of the agriculture of Michigan.

We would respectfully suggest, for the guidance of those who may have the management of Institutes hereafter, that it is possible to have too many papers read at an Institute. If not more than two subjects were treated by essays and discussion at each session, the treatment would be more thorough and of greater benefit to all who participated. Let the local committees attend to the early publication of the programmes, so that they shall be placed in the hands of as many as possible of those who are likely to attend the Institute for some time previous to its being held, that all can be prepared with their best thought on the subjects to be discussed, and there will undoubtedly be a marked improvement in the character of the discussions. By reducing the number of essays it will be an easier matter to find persons competent to write those that are read.

GREENVILLE INSTITUTE.

The Institute at Greenville was held, commencing January 16th. The commodious hall was well filled during all the exercises. An invitation had been given to all who might attend to bring samples of fruits, vegetables, grains, etc. The products of the farm, orchard, and garden which were brought in response to this invitation made an exceedingly interesting display. The exercises were begun with singing and prayer, after which the President, Hon. W. Divine, of Eureka, made the following opening address:

LADIES AND GENTLEMEN:—We are pleased to see so many of you here to-night, to take part in the first Farmers' Institute held in Montcalm county.

The object of this Institute is to educate ourselves in our calling. Let us, then, strive together to elevate ourselves, for much of our success as farmers will depend more or less how we spend our winters. Winter is the time to think and plan; the time to close up the work of the old year, and get ready for the new. The great work of life is to discipline and educate ourselves. The end of each year finds us better or worse. No matter how prosperous the year may have been, if we are less patient, more selfish, proud and conceited, our time has been ill-spent; but if we are growing men and women,—growing in love, joy, peace, temperance and goodness, we are prospering, we have not lived in vain, we are better men and women.

A farmer's best field is himself. This field can be plowed and cultivated as well in the winter as in the summer.

The commencement of a new year is a good time to break up and commence a rotation. And, brother farmers, be careful to sow good seed, and plenty of it. Energy, industry, forethought, patience, and temperance are always profitable crops; and the best farmer is generally the most intelligent man, and a community of knowledge is one of the strongest ties that can bind and bless society.

Every farmer should aim to be instructed, not only in his special calling, but

to know something of general science, of political economy, of taste and general reading. The farmer should be educated in those studies which aim to make him a thoughtful and intelligent citizen. Being the vast majority in numbers, and sustaining the wheels of finance, of trade, manufactures and commerce, the farmer has too much at stake to be behind any in education and influence.

Our fathers endured many hardships and privations, but the young farmer of to-day possesses a wealth of advantages for general culture enjoyed by no other people. And, in Michigan, as well as in many other States, these advantages are being improved, and the yield of cultivated mind is wonderful.

But this culture of the mind in science, taste, and general reading should be based on a higher consideration than that of mere moneyed profit. It should be sought for its own sake and the pleasures which it brings to his home. The farmer should have taste to appreciate and enjoy the beautiful in nature and in art; taste to adorn his home, and his lawns with shrubbery, flowers, and works of art; taste to admire the ripening fruits, and the living groups of animals which he has reared.

R. G. Baird, Secretary of the State Board of Agriculture, was next called upon, who gave an address entitled "The Farmer's Home," followed by the reading of a paper by Prof. Beal on "The Apple Orchard." Both of these are given in the essays and addresses following this record of the Institutes.

The following address was given by Mr. J. E. Taylor, of Eureka :

THE AGRICULTURAL FUTURE OF OUR YOUNG MEN.

My subject may at first seem to be prophetic rather than philosophical, yet a careful survey of its many fields of investigation, I believe, is ample to convince one that the agricultural advancement of the next century may be predicted to within an approximate, if not an absolute certainty.

The future we judge by the past, and by a careful comparison of statistics of past and present generations do we judge of the liabilities of those who are yet to rule both animate and inanimate nature.

As we meditate over the gigantic strides of the agricultural art and science during past centuries, we are forcibly impressed by the fact that man is an industrious being; incapable of remaining in any particular plane of life, he must advance or recede.

While a few have receded, many have advanced. China, whose people it is said knew as much of agriculture two thousand years ago as they do to-day, strikingly represents the indigent few, while the great mass of the German, English, French, and American people represent the industrious, progressive horde who are slowly reducing agriculture to a regular system based upon empirical theories and scientific principles of known value.

To one having a few hours' leisure time, no more interesting subject can be found than antique agriculture. The customs, habits, and systems of the ancient husbandman are interesting because of their intrinsic peculiarities, as well as for the light they throw upon modern principles.

Behold the primeval man, first with a sharpened stick stirring the earth preparatory to sowing the seed, then carefully gleaning the ears, then rubbing the kernels out between his brawny palms. Two wooden trays and the four winds of earth are his fanning-mill. His brightest dreams are of forked sticks, used as plows, drawn by a horse, an ox, a cow, or an ass,—no difference which,—and that hitched by the tail. I am not surprised if some of you think this only a dream, but in the Irish Laws of Parliament of 1634 may be found "An act

against plowing by the Foyle," as follows: "In many places of this kingdom there hath been a long time used a barbarous custome of plowing, drawing, and working with horses, mares, garrans, geldings, and colts by the taile, which (besides cruelty used to beasts) the breed of horses is much impaired in this kingdom." Again, Arthur Young in his "Tour of Ireland," so late as 1776, remarks that it was no unusual thing to see horses plowing hitched by the tail.

But to go back to our subject of later antiquity. At the time of which I speak no greater or higher duty was ascribed to a Roman than that of the husbandman. Each man tilled his little garden, for a farm then but scarcely equaled our gardens. Two acres once constituted a Roman farmer's domains (the amount fixed by law). In Greece a similar state of affairs existed. The Grecian orator Curious once had it said of him that he was not a good citizen, but rather a dangerous man to the State because he would not content himself with seven acres.

To these poor benighted people science had not the power of a vision, and when the old alchemists were vainly laboring to produce gold from the baser metals, no one suspected they were sowing the seeds of such a structure as is our agricultural chemistry. They could not produce the precious metal, but unwittingly they gave rise to a science which deals with the production of that which is more precious than gold,—the sustaining element of the animal creation.

People then saw in the universe only a succession of events. A miracle explained them all. The seed was placed in the soil; there it germinated, grew, fruited and died; none knew why or how. Nature was as yet waiting to be questioned. Our ancestor's miracle becomes to us a natural law. By means of the microscope we see in the little grain or seed the miniature plant, which is yet to develop and increase,—not in number of parts as might be supposed, but in the size of each part. The manner of growth, we are taught, is by cell multiplication. Chemistry teaches us that the means of growth is by the absorption of soluble mineral substances from the soil and by the inhalation of gaseous substances from the atmosphere. Such are a few of the advantages of the young farmer of 1877 over those of his ancestors of a few centuries ago. To one nature was a vast network of chaotic mystery ruled by chance; to the other (if he studies her) she is an embodiment of systematic wisdom, yielding fruits thirty, sixty, and an hundred fold.

It seems fitting to my subject that some slight attention should be given to the implements used by our ancestors as compared with our own.

The plow has been in use over five thousand years. I have already spoken of the primeval plow, and of the grades and styles between this and the Oliver chilled, the Wolverine, or the Gale. Volumes might be written, and lessons may be learned that shall be of value to us who are in the ascendancy of our agricultural experience. The philosophy embodied in the working of a plow is well worthy of the study of every person who is to use one. A slight variation in the proportion or form of some of its parts may greatly diminish its draught, increase its utility, adapt it to a particular soil, or, on the hand, render it worthless. Superior as is our knowledge over that of our forefathers of this implement, few of us know aught of its principle, and none of us know their perfection. Young men of present and coming generations, to you do we look for the perfection of this first of agricultural implements.

The harrow is an instrument of later origin, and though indispensable, is second in importance to the plow. As might be supposed, the first harrow was a

tree-top, and in the fertile valley of the Nile this rude implement was not known. There the seed was sown upon the moist soil and then the farmer drove his cattle over it until the seed was tolerably well trodden in. By either of these methods the results must have been incomplete and unsatisfactory. Now we not only have very much improved implements for depositing the seed, but these implements are so arranged as to give any required depth of planting, the required depth being ascertained by experiment.

In an examination of the systems of agriculture we find less of progress than we do in the implements. We find the system of fallowing was known in very ancient times. Moses ordained that the soil should lie fallowed every seventh year.

It is not surprising that people are at last learning their great mistake in following so long this wasteful system. The system of rotation of crops was known to the early Romans, but it is not until within modern times that it has dawned upon the better part of our agricultural masses that a rotation of crops is economy of time and productive of better results than is the system of fallowing. It is found that the deep feeding plants bring to the surface those elements of plant food which lie beneath the reach of the cereals. It is found that a root crop converts as much inert material into an available form as does the barren fallow. Yet our knowledge of these things is very incomplete, and to the unprejudiced radical young men must we look for their advancement.

Examine for a moment the social position of the farmer from one time to another. The early Romans, with their small farms, were of necessity close together; each enjoyed the full benefits of his neighbor's experience. Much time was spent in consulting upon what produced best effects, and much was learned which is of value in the present day. Then consider what has been the history of American agriculture. Until within a few years the exclusive aim of the American farmer has been to till his hundreds of acres. The farming community has been a group of independent, disinterested workers, characterized by a total want of mutuality, but once again progress dawns upon us. The Grange, the Farmers' Club, and later still, the Farmers' Institutes, are affording us that so much needed opportunity of unreserved intercourse upon farm topics. I need only to point to these as other fields in which our young men must make themselves useful.

Then, again, of all that has been done in agriculture much has been written, but little has been well written. Our agricultural literature is of modern origin. The first English work upon general agriculture was written by Fitzherbert in 1534. I give you a sample of his writings, as follows: "A housbande cannot thrive by his cattell without corne, nor by his corne without cattell. Sheep, in mine opinion, is the most profitabest cattell that any man can have." The earliest of writers upon agricultural chemistry was Jethro Tull, 1731, who maintained that none of the food of plants came from the atmosphere. We need agricultural editors and authors who shall be trustworthy authority, who shall possess a practical knowledge of the principles with which they deal, but how shall we have them if our young men do not fit themselves for the responsibility. This I believe to be one of the fields in which every young agriculturist may find opportunity to be of great use to the world; and further, I believe that at no distant day every farmer will be a writer in his art as well as a practitioner.

Then, in retrospect the ancients in agriculture asked for mere facts, and

learned many of great value. We ask why, and nature has given many reasons of practical worth. To the rising agriculturist belongs the duty of producing causes which shall give required effects.

There is perhaps no greater duty devolving upon the rising agriculturist than that of perfecting our systems of agriculture. I think I should not be far out of the way should I assert that in our own town our farmers lose each year from mismanagement alone more than enough to pay their taxes twice over. How many farmers have a carefully constructed plat of their farm? How many ever make a practical estimate of the amount of stock required by their farm? How many believe the generally accepted truth that it pays better to raise a good animal, even at an increased expense, than it does to raise a poor one? Few practice it, at least. How many of our farmers are one-half as attentive to their business as are our professional men? How many farmers can give an accurate account of their profits on any particular crop, or even on their entire business? Faults, faults, errors, and wanton ignorance! Young man, why stand ye idle, why flee ye into the city, that repository of ill-health, vice, and blasted hopes? Is it because you are ashamed to be a farmer? Cicero said that agricultural pursuits are those in which a wise man's life should be spent. Fathers, why do your sons leave the farm? Is it because you suffer ignorance to be synonymous with agriculturist? I believe there is no greater reason. Educate your sons in the cause you would have them sustain; then shall they be proud of their alliance with industrial pursuits. Should I never labor a single day upon a farm, I should ever look upon the honest, intelligent farmer as the noblest work of God.

How often is the country youth asked by his city cousin if he intends to be a farmer? See him swell up to twice his original size and respond, "Not if I know myself;" or he blushing replies, "Yes, I am such an ignoramus that I suppose I'll have to be a mossback." Better that the moss lie on his back a foot thick than to have a stain of the rust of a street loafer or shop drone. I would not be disrespectful, but there are respectable young men to-day in this city leaning over their counters idling away precious time, contracting indolence and ill-health, courting vice and bantering poverty, who at the age of forty will be eking out a miserable servile life, while their country cousin who is to-day working upon the farm at \$10 to \$15 per month, and carefully storing his mind with useful information, shall then retire from hard labor and survey his well-tilled acres with a satisfaction that yields true happiness.

The educational future of our farmers next attracts my attention. It has long been the opinion of most people that a common school education is all that is necessary for a farmer, and any farmer who has sought more than this has been looked upon as though he were an object of pity rather than a being worthy of commendation. Cultivated talents, good bargains, profitable speculations, and paying offices have been conceded to be the lawful spoils of our professional ranks. The results are that hosts of young men are yearly drifting into the professions, and for every one who qualifies himself well for the position he is to occupy, there are ten others who are neither more nor less than detestable parasites upon society, gaining a miserable livelihood by a scheming, dishonest, reproachful filching from the stores of their poor, ignorant clients. These shadows of wise men fill our cities, our legislative halls, and make our laws, and, allowing me to be the judge, they often legislate quite unwisely. A man can no longer make an honest will except some distant or dissipated relative becomes the contemptible client of a twice contemptible lawyer, and with a sixfold con-

temptible law the dying request of a man is so diverted from its purpose that the honest heirs are cheated out of their dues, while the lawyer takes two-thirds of the spoils and his client takes the other third and pays expenses. Young men of our farming community, will you look upon such things as these and still suffer yourselves to remain uneducated, or will you educate yourselves to cope with the world as you find it; to be a faithful servant in society, an intelligent benefactor to man? Such are your duties in the hereafter; then be not slow to do your duty.

Book farming and book farmers have been looked upon with suspicion, yet who is so stupid as not to observe that they are gaining ground. All new discoveries, systems or inventions are apt to meet with an unfavorable first opinion, and it often takes society years to correct an erroneous idea. When the fanning-mill was first brought into use it was called Satan's machine, it being supposed that Satan was prince of the powers of the air, and for a person to use a fanning-mill was deemed contrary to the text, "The wind bloweth where it listeth," and was a sufficient crime to expel him from the church. Yet in the present day no farmer considers himself the less a Christian for using one of these satanical machines, and we laugh to scorn the ignorant superstition with which our forefathers opposed its use. So a few years hence will people laugh at the errors we now are making, and foremost among those errors will stand the idea that the farmer needs no education beyond that obtained in our common schools. In fact most of us now believe education to be as much for the farmer as for any one else, yet many concur in the old belief.

In conclusion, I believe the advantages attendant upon the agricultural classes in the United States were never so propitious as at the present time, and that the needs of a thoroughly educated class of farmers were never more manifest; that the agricultural future of our young men will be in a great measure what their individual efforts make it.

That, surrounded by advantages such as the Grange, the Farmers' Institutes, our Agricultural College, and the agricultural press, the efforts of our young men in agriculture must hereafter be characterized by intelligence and success; that though educated young men have as a rule sought some professional calling, in the coming century as intelligent and well educated young men will be found in the agricultural ranks as elsewhere; that the rising agriculturist will do much to perfect present systems and to introduce new and needed systems of agriculture. Then, to you, young men, I would say, be up and doing; there is work around us all.

Prof. Beal read a short paper on "The Farmer's Garden," as follows:

THE FARMER'S GARDEN

should be one of the most interesting and profitable parts of the farm. In fact it too often consists of a quarter of an acre or more—a little patch near the house, surrounded on all sides by a picket fence, which is often whitewashed. Here may be found a few currant bushes, struggling with grass, weeds, and briars; a few grape vines, running wild over a tumble down trellis, along the fence, on to the top of the nearest cherry trees, which they injure or very likely succeed in killing. There are often *no* plants of rhubarb, asparagus, strawberries, raspberries, or gooseberries. If these or other perennial plants find a place, they are too often scattered here and there in isolated patches over the garden.

Early every spring, once a year at least with every farmer, at the approach of

dry, bare ground, the annual fever returns to prepare and plant a garden. One year in three a light dressing of coarse manure is applied, and an attempt made to plow it under. Instead of this, there should usually be added yearly a good wagon-load of fine manure. The annual spring plowing is often rendered quite impracticable on account of the scattered patches of perennials above noticed. To spade the ground over is laborious, expensive, and generally unnecessary, if the right plan is pursued. The small quantity of beets, onions, lettuce, peas, radishes, etc., thought necessary to raise, are often sown in close, short rows, running across beds which are elevated six inches or a foot above the path which surrounds each bed. Once sown, they are left for two or three or four weeks, until the weeds make a good showing. The proprietor waits for the seeds to come up. With much labor and perplexity, the weeds are taken out, and many of the garden plants with them. In two to four weeks the beds perhaps are hoed again, requiring a great deal of patience and perseverance for so small a patch of ground. The shrubs and trees are left to run about their own way. For a great portion of the year it is a dreary and desolate spot, neglected and unfrequented, shut off from view by itself. When thus managed, the results are most unsatisfactory, giving but a poor return of poor vegetables and fruits for the labor bestowed upon them.

The above picture is not overdrawn, and many a one will think the writer has been looking over into the garden of the reader or that of some of his neighbors. Much of this poor management comes partly from ignorance and partly from a feeling that time spent in the garden does not pay good returns. Many have never been accustomed from childhood to have anything to do with planning and tending a good garden. At table they never learned to miss many of our best vegetables and berries in their season. They have looked upon everything in this line as expensive luxuries, except potatoes, onions, beets, a few cabbages, tomatoes, and currants. They have not realized the advantage of a liberal supply of gooseberries, strawberries, raspberries, grapes, asparagus, rhubarb, celery, salsify, parsnips, squashes, and Lima beans.

I shall never feel satisfied until there is a society in our State, and others in different countries, to offer liberal premiums for the best farmer's garden. I see no way by which more good can be done than by awakening an interest in this subject. There should be committees to visit such gardens, and report like an orchard committee, which has been such an excellent feature of our State Pomological Society.

I will now suggest a few things by way of improvement on the farmer's garden, as described above. In the first place, remove the fence on two sides, at least, and leave a strip of grass on two sides or ends, wide enough for a horse to pass onto and turn around without tramping down the cultivated plants. If not naturally well drained, put in tile, or select another place for the garden. Put on manure as above mentioned, thickest where certain crops are to grow which require the most manure. Plant the currant bushes, pie plant, asparagus, raspberries, and all other perennials at one side of the garden by themselves, thus leaving the space for the annuals all in one piece, which may be easily plowed. Waste no time in making raised beds, which is labor worse than thrown away. Make a plan of the garden, at first designating just how much space shall be devoted to each variety. Do not plant every thing at once, but leave space for planting more for a succession. Draw a long stout line (the size of a pipe-stem) across the garden or lengthwise of it, making the rows as long as the shape of the land will admit. Plant by the line, or by the marker which runs

by the line, taking pains to make the rows straight. Cultivate the land just before sowing the seeds. *Never wait* for the weeds; if you do, they are sure to get the start, but rake or run a hand cultivator between the rows as often as every four to seven days. Many crops may be sown far enough apart to admit of culture by horse. But little time will be required just before or after the day's work in the corn-field or other work. Do not think it lost time. Plants well cared for will thrive. The garden will look well, yield abundantly, be a source of profit and delight to the whole family. No part of the farm will pay so well in good living, in dollars and cents, as a well tilled garden. Keep ahead of the weeds,—cultivate with the horse, the hand rake, or hand weeder.

More thought and care by parents in reference to this subject will aid in making home more attractive, and it will be a strong tie to keep the sons and daughters at rural pursuits.

FORENOON SESSION.

Prof. A. J. Cook, of the Agricultural College, was called upon, who read the following paper on

BOT-FLIES IN THE HORSE, COW, AND SHEEP.

Bot-Flies.

The insects which form the subject of this lecture belong to the great sub-order *Diptera*, or two-winged flies, which are but too familiar to you all in our mosquitoes, house-flies, blow-flies, horse-flies, cheese-flies; and the still more dreaded Hessian fly, wheat midge, and cabbage, onion, and radish flies.

Characters of Diptera.

As the name indicates, these insects usually possess two wings, undergo complete transformations, that is, the three forms, larva or maggot, pupa, and imago or mature fly, are so different that no one not versed in insect life could ever dream that they sustained the relationship of child to parent. The mouth parts, too, are peculiar in that the upper and lower lips, called labrum and labium, respectively, and first and second pairs of jaws, technically known as mandibles and maxille, are all more or less awl-shaped, and when united form a sharp sucking tube. For additional testimony on this point I would refer you to gnats, mosquitoes, horse-flies, etc. In many flies the lower lip ends in a fleshy hemispherical pad, which, under the microscope, is really a thing of great beauty. The house-fly and blow-fly furnish illustrations.

No Structural Features among Organisms Necessarily Persistent.

I have said that the *Diptera* possesses two wings, and though usually true, yet, as in all other sub-orders, so here we find apterous or wingless forms. Fleas, sheep, bird, and bat ticks, and bee lice are examples. Though wingless, other structural features pronounce them unmistakable *Diptera*.

Sometimes, as in the very forms with which we are to-day especially interested,—the bot-flies,—the mouth parts are partially or wholly aborted. Yet the two wings, with other characters, show that they are *Dipterous* insects.

Again, in some the transformations are far more complete or marked than in others. Thus we recognize one of the strongest arguments in favor of the now generally accepted theory of evolution. It is as if all *Dipterous* insects had started from some one primal form, and through differences in development, there had resulted the wondrously varied forms that to-day so interest the student of entomology.

Remarkable for Variety of Habits.

A very marked peculiarity of this sub-order is the unparalleled variety of their habits. The mosquito family while larvæ feed upon the noisome particles in our stagnant pools, and thus by consuming the germs of malaria become important sanitary agents. The mosquitoes may hardly be so regarded, since our medical men now look with ill favor upon the practice of phlebotomy or bleeding. Some of the flea family, together with many flies, feed as larvæ upon decaying organic matter, the ordure of our stables and outhouses and other filth, while as mature flies they attack our domestic and other animals, and even claim tribute from man himself. One species of the flea family, the jigger of Central America, burrows under the toe-nails of the natives, or of their pale-faced visitors, and thus produce distressing sores, which may become very serious. The *Dipterous* ticks and bee-lice live by sucking blood from the animals which they infest. Some of the *Diptera* are gall-flies. They lay their eggs upon various plants,—the willow is a favorite,—and the larvæ which hatch from these, by feeding upon the plant, excite excessive growth. Thus the galls arise, which form both house and food for the larvæ till they issue as fully developed flies. Some of the *Diptera* are predaceous, that is, they kill and eat other insects; others, which are closely related to the house-fly, are parasitic. These lay their eggs on other insects, which are fed upon and destroyed by the larvæ which hatch from the eggs. Both the predaceous and parasitic *Diptera* are very valuable to the farmer, as they destroy hosts of his insect enemies which otherwise would bring all his efforts to naught. Others still attack our grains and vegetables and do irreparable damage. In fact there are *no worse* insects than the wheat midge and Hessian fly, for these insects usually destroy to the tune of millions. Lastly, some of the *Diptera*,—the whole family *Æstridæ*, or bot-flies,—exist while larvæ within other animals, either in the natural cavities of the body or else in cavities which by their irritation they form, and it is to these that I ask your special attention.

Æstridæ Family.

The bot-flies are stout, hairy insects, and in a general way much resemble species of our wild bees, though their bodies posteriorly are more pointed, while the females possess a spy-glass like ovipositor. The mouth is very small, while the mouth organs are nearly abortive. The antennæ are very small and are inserted in small rounded pits.

The flies take no food; in fact, their mouths are too weak and rudimentary to permit of it, their only purpose seeming to be to arrange for the continuance of the species.

The eggs are usually deposited upon some particular part of the animal infested. These eggs soon hatch; in some cases, indeed, it is said that they hatch even before deposition, such flies being ovoviviparous. The maggots are whitish, thick, fleshy, footless, and have on their bodies rows of spines, by aid of which they move about. The mouth is small, and sometimes surmounted

by hooks, but in other cases only by fleshy tubercles. The stigmata or breathing pores are placed in one or two scale-like plates near the usually enlarged posterior extremity of the maggots. The maggots moult twice. Their food is usually, if not always, the puss or matter which arises from the irritation which they cause.

They go into the earth to pupate. The pupa is what is termed coarctate; that is, it is in form of a seed, the insect being surrounded by its last larval skin, which forms a smooth covering and entirely hides the wings, legs, etc., of the prospective fly.

There are numerous species of these bot-flies, each of which deposits on some particular mammal, and usually in some definite place. In tropical America there are species that infest man, working in tumors under the skin, very much after the style of our cattle bot-fly, soon to be described.

There are really two well marked divisions of these flies, founded on the position of the larvæ in the animal infested. Some work just under the skin as in the cattle and squirrel bot-flies, while others work in the natural cavities of the body, and unlike most of the others, may inflict serious harm to their hosts.

A matter of interest, and one really worthy to excite our wonder, may well be mentioned right here. It is the extreme nervous action, often indicating dire alarm, with which animals receive the flies as they come to deposit their eggs. You have all of you observed this in the horse and sheep. The veriest hack of a horse, one that has seen hard service for a score of years, will jerk its head as if pierced by a needle. This show of dread is no less marked with cattle and other quadrupeds, on which these flies practice nidification. The reason for this alarm is quite obscure. It would be supposed, and is probably very generally thought, that the flies, like bees, have the power to make their presence felt. But this is not true, as anatomy well proves, for the mouth and ovipositor are so weak and yielding that neither could possibly injure, even the most sensitive membrane; then certainly the tough skin of the ox and the horse could feel no hurt. It has also been supposed that a wise instinct, prompted by prospective danger, makes the sharp clear tone of the bot-fly's hum a note of alarm, and hence the uncontrollable fear of those mammals which are liable to attack. The objection to this reasoning is, that with the deer and our cattle, the evil is not one of danger or even of great inconvenience, as will appear, and in such cases the wise instinct greatly blunders. A third explanation, and as I think, the most tenable one, is that this unreasoning dread is of nervous origin. These animals learn to associate the hum of insects with pain. They are ever and anon feeling the stab of the keen, stinging lancets of the various deer and horse flies, and as the bot-flies dart toward them, their presence made all the more obvious by their loud note, the poor persecuted animals, impelled by nervous impulse, become frantic ere there is chance to learn that mere noise is not to be dreaded. Yet even here impulse may be of great service, for in fleeing from apparent evil, a real danger may be held at bay.

Horse Bot-Fly.—Gastrophilus equi, Fabr.

The horse bot-fly is certainly the most commonly observed, if not the most to be dreaded, of all our species. There are, too, more than one species attacking the horse, but as the one named above is by far the most common, and as the habits of all are much the same, I shall rest content with detailing the life, history, etc., of this one.

Natural History.

The flies (Fig. 1*), which may be seen from early summer even till autumn, are thickly set with brownish hairs, while the wings are plainly specked with darker spots. The eyes are black and wide apart, while the face in front of them is whitish. The thorax has a central spot of black, and the abdomen, between the segments, is darker than the general color, and it is also flecked with darker spots. The abdomen of the female is tapering, and terminates in an extensible ovipositor, which bends down underneath the abdomen. The male has a more oval abdomen, and is also of a deeper brown than is the female. The female deposits her eggs beneath the lower



FIG. 1.

Gastrophilus equi.—
Horse bot-fly.

jaw, along the mane, upon the shoulder, and even more abundantly along the forward legs, within and below the knees. Does the female remember when she herself was young, and what were then her needs? Else what teaches her to so place her eggs that the young bot, now soon to issue therefrom, will most readily be taken into the mouth and carried to the stomach, upon which event their very lives depend. The light yellow ovoid eggs are glued one at a time to the hairs, much to the annoyance of the horse, as denoted by the quick jerking movements of the head and stamping of the feet. The young are already nearly developed in the eggs, from which they soon issue, though the empty shells may remain away into the winter. As the horse licks itself or its companions, sometimes impelled, perhaps, by a tickling sensation induced by the movement of the wee bots, these latter are lapped up and conveyed to the throat or stomach.

The bots (Fig. 2) are stout, fleshy larvæ, nearly egg-shaped, the mouth being at the tapering end. They are whitish, becoming darker with age. When full grown they are about one inch long. About the mouth are hooks by which they maintain their hold, while the spines are in double transverse rows, extending around the anterior border of each ring. These spines are reddish, with dark tips, and point backwards. There are no spines on the two posterior segments. The last segment is truncate, and has fleshy lobes which conceal the spiracle plates. These bots attach for the most part to the mucous membrane of the left side of the stomach, though they are often found in the throat, on the right side of the stomach, in the small intestine, and when full grown in and about the anus. When found their head is buried in small depressions (Fig 3). I recently examined the throat of a horse which was supposed to have been killed by bots, and found it quite full of these pits, each with its bot.† In spring and early summer these maggots pass from the alimentary canal of the affected horse, enter the ground and within their own skin assume the pupa state. They remain as pupæ between one and two months, when the mature fly again appears.



FIG. 2.

Horse-bot.

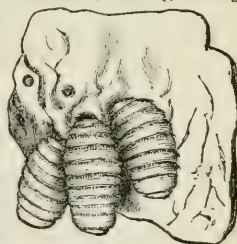


FIG. 3.

Horse-bots at work.

Effect Upon the Horse.

In the throat, when numerous, the bots may cause much inconvenience;

*The figures in this article are all from the valuable work of Prof. James Law, of Ithica, New York,—“The Farmer's Veterinary Adviser,” who generously gave us the use of the engravings from which to procure electrotypes.

†Professor Law writes me that there are well authenticated cases of horses having died from such attacks.

inflammation will result from the irritation, and we have all the symptoms arising from a severe throat affection. The throat already referred to was from one of five horses which died in Clinton county the past season. There seemed to be serious throat trouble, although the bots were not confined to the throat, but as I learned from Mr. Fletcher, of DeWitt, they were found in the œsophagus, through which he said they had eaten several holes. When very numerous in the stomach, especially if attached to the right side, or in the intestines, they may by their irritating presence seriously impair digestion and probably cause death. It is not true, as frequently affirmed, that the bots eat through the membranes of the alimentary canal. The finding of cavities in post-mortem examinations has doubtless led to such conclusions. Such cavities may result from digestion, as the gastric juice frequently acts on the stomach after death. I have seen such cavities and from this cause in the human stomach on post mortem occasions. Rupture, too, may occur in the œsophagus or stomach because of the disintegration caused by the irritating presence of the bots. I think this is not very infrequent. I think *all bots* live mostly upon the pus which their own irritation causes, though in the horse they may gain nutrition from the same source as that from which the horse receives it. The injury which the horse receives is due largely if not wholly to indigestion caused by the unhealthy condition of the mucous membrane of the alimentary canal, which is induced by the bots. While we have reason to think that the bots may cause serious trouble and even death, we cannot but think that, as with worms in children, they are often accused of that for which they are in nowise responsible. As the maggots pass from the intestines they often hook on to the skin about the anal orifice, and thus cause extreme discomfort. The poor horse switches its tail and moves with much reluctance. Fortunately, the removal of the bots when in this position is not difficult.

Symptoms.

Prof. Law, in his valuable work, "The Farmer's Veterinary Adviser," states that it is hard to distinguish irritation from bots from other forms of indigestion and colic. If occurring when the horse has an empty stomach, and the maggots are presumably hungry, or if in spring and early summer, if the bots are found passing with the feces, if the horse turns up his lips as if nauseated, and if the margins of the tongue are red and fiery, and we may add, if the throat is sore and the horse keeps extending its head, then we may surely suspect bots.

Treatment.

Of course, if the eggs are removed before hatching, by cutting off the hairs which sustain them, or if they be daily washed off by use of soap suds, we shall prevent all farther trouble.

Prof. Law says, "We know of nothing that will destroy the bots in the stomach." He says that vermifuges, like oil of turpentine, ether, and benzine, though not reliable, will prove most effective in autumn and early winter, as the bots are then young, and most susceptible. Colics are to be treated by antispasmodics (tobacco, stramonium, laudanum, etc.) and mild laxatives, and *the animal must be fed well*, to support him under the drain, and to keep the bots gorged, lazy, and non-irritating. A good dose of physic will hasten the exit of the larvæ, as they commence their leave-taking in summer.

Other Species.

The *Gastrophilus nasalis* is a smaller species with a red thorax, some white

on the abdomen, and with unclouded wings. The *Gastrophilus pecorum* is more yellow, while the *Gastrophilus hæmorrhoidalis* is easily distinguished by the bright reddish tip of its abdomen. The larvæ and pupæ of these species are much the same in habits and appearance as those already described.

Sheep Bot-Fly.—Estris ovis, Clark.

This insect, while on mischief bent, is usually referred to by sheep raisers as "grub in the head." It would be more proper to say maggot in the head, as the word grub is more usually applied to the larvæ of beetles.

Natural History.

The sheep gad-fly (Fig. 4), like that of the horse, appears from June till September. It is about the same form, too, as the *Gastrophilus equi*, and when at rest or on the wing, is quite like our smaller horse-flies in appearance. The color is light ash, dotted and lined with black. The eyes are dark, and above and between these are three simple eyes. The female, after mating seeks to deposit her young—for these are ovoviviparous, the eggs hatching within the mother-fly—about the nose of the sheep, the only labor that is given them to do. They cannot take food even, as the poor things are entirely mouthless. I say poor things, for as they have some hundreds of young to provide with positions, it would be safe to conclude that a lunch at least would not come amiss. The sheep receive these attentions with no less worry and distress than that manifested by the horse on similar occasions. They show their fear and annoyance by their bowed head, by shaking the same and stamping their feet, and often by flight.

The bots (Fig. 5), by means of their hooks and spines, pass up the nose, causing by their irritation an increased flow of mucus, on which they feed. They may even reach the sinuses of the frontal and maxillary bones, and in some cases the brain. When full grown the maggots are an inch in length. On the dorsal surface of each ring are two brown dashes, on the sides are raised spots of the same color, while the general color is whitish. The rows of spines are very minute, point back, and are only on the ventral surface of the rings. There are two hooks at the mouth, above which are the same number of tubercles. The breathing-pores are in the last segment. They are in small plates, and the entire segment can be retracted. When full grown they leave the nostrils, fall to the earth, in which they at once assume the pupa state.

The pupa condition lasts about two months, when the case becomes uncapped and the fly issues.

Effect Upon the Sheep.

Even such good authorities as Youatt and Clark deny that these bots do any special harm. But there can be no question but that our leading sheep men are correct in the opinion that they do serious injury to the animal, and when very numerous, especially if they pass to the brain, may, and frequently do, cause death. The severe inflammation of the nasal membrane, reaching even to the sinuses, together with the abundant discharge of purulent matter, gives quick indication of a condition which no shepherd would desire.

Symptoms.

The sheep lose their appetite, shake their heads, seem inclined to butt, and finally stupor and great weakness result. The mouth and nasal membranes show great inflammation, while there is an unhealthy discharge from the nose.



FIG. 4.
Sheep gad or
bot-fly.



FIG. 5.
Sheep-bot.

Treatment.

As before, prevention is worthy a first notice. The sheep-breeders have found that by tarring the noses of their sheep they render them exempt from attack. To do this with slight trouble, two-inch holes are bored into logs, into which salt is placed, and the edges then smeared with tar. As the sheep reach for the salt they receive the needed application of tar. It is the practice, too, with some, to plow a furrow that the sheep may gain protection by pushing their noses into the earth. This *may* be partially effective. Early, while the maggots are in the nasal cavities, it would be desirable to brush these cavities with a feather moistened or wet in oil of turpentine. It is also suggested that we induce sneezing by administering snuff or lime, and that we kill the bots by introducing vinegar, solutions of salt, tobacco, or a weak solution of turpentine, after first shutting the sheep into a warm place, that the maggots may leave the sinuses. If the larvæ pass to the brain, or if they are very numerous in the sinuses of the bones, cure is well nigh impossible.

The Cattle Bot-Fly—Hypoderma bovis, Latr.

Few farmers' boys have failed to note the lumps on the back of some favorite steer or heifer, and with real sorrow traced the true cause to the large ugly bot, which they with great joy found could be forced from its snug burrow, and their pets freed from the loathsome plague. With what added interest have some few—naturalists by nature—watched the sleek old culprit, carefully traced the future development, until at last they were delighted with the rich possession—self-won—of a full knowledge of its entire

Natural History.

The imago or fly (Fig. 6) so much resembles a dwarf bumble-bee, that quite likely it has often been mistaken for one. Like the bumble-bee, it is densely hairy, except that the thorax is black from nudity, rather than from hairs of that color, as in our bumble-bees. The head, two broad bands on the thorax, and the base of the abdomen are yellowish white, the middle of the latter black, while the tip is reddish orange. The mouth is very rudimentary, the eyes ocelli or simple eyes; halteres, or rudimentary second wings, and the ovipositor in the female are plainly visible. These appear as before in summer and early autumn, and after pairing, the females at once commence their only mission of egg-laying.

The eggs are placed on the backs of cattle, a preference, if there is any, being shown for the sleekest kind of the herd. Some have supposed that this was a painful operation, as the cattle are made fairly frantic by the operation. I think, however, that this is a mistake. The ovipositor seems too slender and weak to work the slightest injury. The explanation already given seems to me the more rational.

The larvæ (Fig. 7), so soon as hatched, pierces the skin, and by its irritation causes quite a tumor, which increases with the growth of the maggot. The bot feeds on the pus and is never without air, as the tumor is always kept open. The color of this maggot is white at first, but becomes brown with maturity. They have the spines in rows, as also seen in the horse-bot, but the mouth, like all cutaneous bots, contains fleshy tubercles instead of the hooks. The sphericle plates at the posterior of the body are always at the window. We should



FIG. 6.

Cattle bot-fly.

FIG. 7.
Cattle-bot.

suppose they would desire fresh air, shut up in such abodes. The larva matures about May or June, when it is fully an inch in length, backs out of its filthy chamber and falls to the earth. The abscess soon heals.

The insect, like all of this family, pupates in the ground, the pupa differing only in size from those already described.

Effects on Cattle.

These seem to cause little inconvenience. In fact it is not uncommon to see the sleekest cow or ox thickly covered with these tumors. While they seem to do no serious damage, I am still of the opinion that the cattle would be quite as well off were they rid of these parasites. The worry caused by the tormenting presence of the flies is certainly an evil.

Remedy.

I am unable to suggest any method to remove this enemy. Of course the evil may be abated by pressing the maggots out of the tumors, but as this will never be so generally practiced as to eradicate the pest, it is plainly impracticable. We can only rejoice that the disadvantage is so slight.

There are many other species that form tumors on different animals, very much as described above, only one of which I will mention: the *Cuterebra emasculator*, Fitch, which infests the squirrel. The eggs are laid on the scrotum of the animal, and the bots not infrequently produce effects which suggested the specific name. There is no question but what many of these animals have died in our State because of this enemy.

Following Prof. Cook's paper several questions were asked and answered as follows:

Mr. Henry Greene.—“Is there any season when the horse is free from the bots?”

Prof. Cook.—“The probability is they may be found in the horse at any season; still the horse may be without them early in the year, just before the season of the perfect insect.”

Mr. S. Satterlee.—“Does not the fly in laying the eggs, even if she does not probe the horse, irritate by pulling the hair?”

Prof. Cook.—“It is my impression that the irritation of the animal is from nervousness rather than any thing the fly may do, except buzz. When a boy I would jump if I stepped on a round stick, because of my excessive dread of snakes, and I apprehend that this is the best way to account for the dread the horse has of bot-flies.”

Mr. James Taylor.—“Are not the bots licked into the mouth while eggs and hatched within the animal?”

Prof. Cook.—“This is quite probable, but I think the most usual way they get in is by first hatching on the outside and by stirring around cause irritation, which the horse tries to relieve with the mouth, and in this manner captures them.”

Mr. Bradish.—“You recommend clipping the hair of horses having bots' eggs upon them. Will not their eggs hatch that are thus cut off?”

Prof. Cook.—“With suitable conditions of warmth and moisture, yes; but there is no danger from these, as there is no chance of their getting where they can have any thing to eat before they die. I would like to ask a question of the audience: “What is your impression about the cattle bots,—do you find them most frequently on the backs of fat or lean cattle?”

A vote was taken, resulting in five for the fat cattle and fifteen for the lean stock.

Prof. Cook then said this was his own impression, as a boy, that the scrawniest cattle were more likely to be attacked by the fly, but since taking careful notes of the cases he had changed his opinion.

Next in order was an essay by James Satterlee, of Eureka,

SHALL WE FIGHT OUR INSECT ENEMIES?

Among the sciences that man has been turning to his own practical use within the last fifty years, is that of entomology. By this we mean the science that treats of the various forms of insect life. But what is there interesting or valuable in the study of such uncouth forms, such "horrid bugs" as are included in this the greatest division of the animal kingdom? I do not mean the greatest in the size of its members, but in the number of its species, for in that it excels all others. Is there nothing of interest in the change that transforms the loathsome tomato-worm, with its reputed deadly horn, into the graceful sphynx that gathers sweetness from your petunias and evening primroses in the twilight of an August day? Is there nothing wonderful in the transformation that changes the ragged willow caterpillar into the beautiful Vanessa butterfly that remains with us during our long winters and gladdens our eyes the first warm days of spring? Is there nothing worth studying in the natural history of the bee, or even of the ant, to whom the wise man has referred us?

But the scope of my paper will not permit me to speak further of the more interesting part of this subject. I will take for granted that you concede there is something of interest in the general history of insect life, and proceed at once to the practical part of the topic assigned me, that is: shall we fight our insect enemies? Why do we speak of our insect *enemies*? Are there insects that prey upon the crops of our fields, orchards, and gardens to any appreciable extent? To answer this question, I have only to allude to the well known fact that our wheat is preyed upon by two species almost too small to be seen by the naked eye, yet seriously affecting the crop many seasons. Our corn is cut off as it makes its appearance, and the roots eaten and destroyed in many cases. The leaves of all our garden vines are eaten to skeletons and the last drop of sap sucked from the roots by insatiable pests that are always vigilant. Our potato tops are a certain prey to the untold millions of hungry mouths that are on the march toward the sea. Our apples are bored through and through, the trees denuded of their leaves, their young twigs sapped, and bodies girdled and perforated, all by different members of the insect world. Our plums are a total failure on account of the little Turk that leaves his crescent mark upon the fruit, and we find the same mark inflicting more or less injury to the cherry, peach, and other fruit. It is said that every plant that grows has its enemies. Our forest trees are a constant prey to them. Even the sturdy oak is not free from their attacks; and I might cite further evidence that we have many insect enemies, but I trust this is sufficient.

An enumeration of some of the species that work this injury may be of interest. I will only speak of a few of the most important. Among these is the Hessian fly, which lays its eggs upon the wheat in September. The egg hatches in three or four days, when the larva passes down the leaf and takes possession of the base of the stem, from which it sucks the juice, thereby weakening the plant. It remains in the same position to become a pupa, and in the spring hatches into the perfect fly, which again lays its eggs upon the wheat, becomes

a larva and a pupa as before, hatches from the stubble in midsummer, and is ready to repeat the process again upon the early sown wheat of autumn. The midge also works a great deal of damage in some seasons by laying its eggs upon the heads of wheat just before it is ripe. This soon hatches into the little orange colored maggot which destroys every kernel with which it is in contact. Our corn is frequently seriously injured by the cut-worm, and when planted upon low land by the wire-worm. These cut-worms, of which there are several species, do great injury in our garden vegetables. The enemies that are so persistent in the destruction of cucumber, melon, and squash vines, are the striped bug and the squash bug.

The principal enemy of the potato is the Colorado potato beetle. This is undoubtedly the most noted of all our insect enemies, coming as it did so suddenly upon us and taking such complete possession of our potato fields. The damage it does amounts annually to millions of dollars.

The principal enemy of the apple crop is the codling moth, whose larvæ bore through and through the fruit, rendering it unfit for market or for use. The trees are attacked by the aphid, which sucks the juice from the growing twigs, while the canker worm and the tent-caterpillar strip the tree of every leaf, and two species of borers attack the body.

The curculio is the little Turk that takes such especial delight in the destruction of plums and cherries.

The beautiful Clytus destroys maples, while borers and grubs attack the oaks.

By this we see that our insect enemies are both numerous and active. They are constantly at work. Their numbers and their activity warn us that we must fight them.

First, we need an accurate knowledge of their habits. A knowledge of the habits of the Hessian fly, for instance, enables us to destroy large numbers of the pupæ by burning over the stubble soon after harvest.

The habits of the potato beetle are easily understood. They are few and simple. The principle one is that it eats. It eats constantly in all stages of its growth. It is through this habit that we are enabled to introduce Paris green into its stomach. It would be well for us if we could manage all our insect enemies as easily as we can this one. But there are few that we can destroy with poison.

The currant worm, that we may expect here the coming season, is destroyed by sprinkling powdered hellebore upon the leaves.

The striped bug is driven away by sprinkling plaster and ashes, mixed with a little sulphur, upon our vines.

There are many insects, however, that will eat nothing that we can give them, such as the borers, codling moth, curculio, and others. These we have to manage in some other way.

The borers we cut from the bark with a knife, or kill them in their holes with a sharpened wire; or, better still, we kill the eggs before any damage is done by washing the trees with a strong solution of soap, in June or July.

The codling moth is destroyed by fastening, with a string or tack about the trees, bands of coarse woolen cloth or paper, under which the larvæ secrete themselves to undergo their transformation. These bands are examined once in ten days after the first of July, and the larvæ that have secreted themselves are killed and the bands replaced. The orchard requires clean culture, and the rough bark must be scraped from the trees in order to compel the larvæ to go under the bands for a hiding place. Hogs in the orchard are also of much

benefit in eating up the fallen fruit before the larvæ have taken their departure.

The curculio is most successfully destroyed by the jarring process. This has been so often described that it seems almost superfluous to repeat the description. At the risk of being tedious, however, I will give the outlines: As soon as the blossoms begin to drop from the trees, a sheet is prepared of strong cloth with an opening in one end reaching to the center. A small strip of wood is then sewed to the whole end, and also to each part of the open end, for facility in handling. Two persons will carry this from one tree to another, and, by a sudden jar, all the curculios upon the tree are shaken upon the sheet, from which they may be emptied into a pail, or caught and killed. This process must be repeated two or three times a day while the curculio lasts. It is not expensive, and never fails when faithfully carried out. The curculio is also destroyed by placing chips under the trees about the time they begin to blossom. They secrete themselves under these chips and are easily caught and killed.

Squash bugs are also caught in the same manner.

Cut-worms are killed by digging them from their hiding places; also by plowing the land in the fall, thus exposing them to the action of the frost, and to the attacks of birds.

Wire-worms are rendered less destructive by draining the land infested by them and applying a good coating of lime. Mr. J. Strange, of Grand Ledge, told me that a part of his corn-field, planted with a hand planter last spring, was much less injured by the wire-worm than that planted with a common hoe.

All the knowledge we can get of the habits of these various insects, however, is not sufficient to enable us always to cope with them. Some, indeed, seem beyond the reach of any remedy. But nature has provided aid in every case. There is a beautiful harmony in her work when not interfered with. No one animal is allowed to become very predominant at the expense of all the others. If it is true that every plant has its enemy somewhere in the insect world, it is also true that every one of these has some parasite whose duty it is to hold it in check, or prevent its undue increase. The greater the capacity of any species for its multiplication, the greater the number of parasites there are that prey upon it.

It is said that the potato beetle has more than twenty species of parasites that are bent upon its destruction.

Before man had begun to clear off the forests and break up the soil, nature's laws in regard to animal life were not interfered with. Each species held its own. The amount of food for each remained practically the same year after year. But man introduces new conditions. The growth of a particular kind of plant food gives increased facilities for the multiplication of those species that feed upon that plant. And as these multiply, the parasite whose duty it is to hold them in check finds equal facilities for increase, so that in a few years these balance each other. If there is any falling off in the production of the given plant, there is a falling off in the number of its enemies, and the parasite for the time being has the advantage. The enemy may indeed become nearly or quite extinct, and with it also the given parasite in that locality.

Should a frost, for instance, destroy every plum and cherry blossom in Michigan, in any one year, the curculio would become nearly extinct for the time being. We cannot conceive of its becoming wholly so, however, for nature has provided against such a contingency, and probably for the parasite also in the

same proportion. If it should become extinct in any locality it would be easily introduced from adjoining territory, for our whole land is becoming almost a continuous orchard from one extremity to the other.

We see how this principle of amount of food has worked in the case of the potato beetle. When man had planted the potato near enough to its original home in the Rocky Mountains, it found the food thus introduced exactly suited to its taste, and immediately showed us its wonderful power of increase under favorable circumstances; and it has traveled the bridge of potato tops that it found extending eastward from the great plains of the west, till it is waiting a chance to take passage to fresher fields on the other side of the Atlantic. Fortunately, its enemies are numerous, and Paris green is a sure remedy when faithfully applied.

Another instance of the amount of suitable food influencing increase is that of the grape-vine phylloxera. A native of this country, it unfortunately found its way to France, where it has increased with wonderful rapidity, and been the occasion of untold ruin to the vineyards of that land. As its food increases in our own land it is becoming quite destructive; but its natural enemies will probably have little difficulty in holding it in check.

I have spoken sufficiently of the aids which nature has provided in the way of parasites. Another important aid to man for the suppression of his insect enemies is many species of birds. Robbins, blue-birds, black-birds, and crows for the cut-worm and white-grub, and the wood-pecker for the borers. I have in my possession specimens of the wood-pecker's work in extracting borers from the oak. They never fail to strike the right place. If mankind were not such hereditary enemies to the birds, I think these same wood-peckers might be taught sufficient confidence in their friends to learn to peck the borers from our fruit trees every year.

There are, however, two sides to this bird question. We need to observe closely the habits of all in order to decide which are our helpers in the war against the destructive insects. It will not do to jump at conclusions. A few years ago I vowed vengeance upon a flock of crows that were busily engaged every day in my corn field. I supposed they were pulling up all the corn. Upon investigation, however, I found they were digging out the cut-worms, and in no case that I could find had they disturbed a single kernel of corn. I have seen them at work in the same manner in a field of oats just up. In the same way we may find that many species of birds that we think are unmitigated nuisances are really of great benefit to us.

In closing this essay, I will say that with all the aid nature gives us by means of the parasites and the birds, we can only be successful in the war against our insect enemies by united, harmonious action. One man in a community will have little effect; but if we all work with a will for the accomplishment of a given purpose, and that purpose the extermination of our insect enemies, success is certain.

Following Mr. Satterlee's paper ensued a short discussion, as follows:

Prof. Cook.—I most heartily concur with Mr. Satterlee in the use of white hellebore for currant worms, and believe that no man can afford to allow the worms to denude his bushes at the present price of the remedy. I prefer to apply it with water, as Paris green is often applied. I wish to make one slight criticism upon a single thing in the paper. Mr. Satterlee spoke as though the curculio could be exterminated if all the fruit upon which it preys could be removed one year. Perhaps this may be so, and yet Mr. Ransom, of St. Joseph,

Michigan, exhibited to me one of the little Turks that he had kept three years in a bottle with no food, and the curculio still lived. Perhaps the smell of the bottle may have been sufficient stimulus to retain life. They say it has this effect upon some men."

Mr. J. M. Fuller.—Is the currant worm mentioned in the paper what we know as the web worm?"

Prof. Cook.—"No; the web worm is what is commonly termed a measuring worm, and has not been known to do much injury in this State as yet."

Mr. A. C. Satterlee.—"When shall we plow to kill cut-worms?"

Mr. J. Satterlee.—The more prevalent opinion now among accurate observers is that plowing in the fall is not for the purpose of turning the worms up to freeze to death, but to allow the birds a good chance at them; and with this idea, of course early fall plowing, before the birds leave, is the most advisable method."

Prof. Cook.—"I would plow early and harrow well, so as to give the black birds a chance for a good round meal before they leave us. As regards the effect of frost upon the cut-worms I cannot do better than quote my own experiments. I have subjected them to 30 degrees below freezing point and from this ordeal they came out lively. My impression is that the freezing-out remedy exists no farther than a hypothesis."

Mr. Bradish.—"I am satisfied from my own experience that fall plowing late is the best, no matter what the theory may be."

The following question was voted upon: How many present believe in fall plowing to kill cut-worms? Nearly all answered in the affirmative. The question of how many had, the past season, showed their faith by their work, was put and less than half had plowed for this purpose.

Mr. Garfield.—"What is the prevailing impression as to the soil best adapted to the work of the wire worm?"

Several answered that their devastation generally was more marked upon low, black soils or heavy clays.

Mr. Watkins, of Kent county, was decidedly of the opinion that fall plowing was death to the worms only as it brought them into the clutches of the birds.

AFTERNOON SESSION.

Mr. C. L. Garfield, of the Agricultural College, gave the following address on

"LANDSCAPE GARDENING FOR FARMERS."

It is such an easy thing to talk of beauty and beautiful things, in a sort of general way, without giving any genuine instruction, that I hesitate at the very outset for the sake of making a resolution that my aim in this short address shall not be to say pretty words about pretty possibilities, but rather to suggest and point out a popular want among the farmers of Michigan, and state some practical methods of answering it.

The popular opinion, too, often would sneer at placing in so intimate a relationship the two extremes of my title, for the term landscape gardening brings

up a picture of some grand old place upon which the income of a fortune has been expended, or a beautiful park like those in our large cities, supported by a general tax which private means can ill afford to expend, while on the other hand farmers are men of muscle, who follow the plow and handle the spade from early morn till dark to raise the grain and vegetables for the word to live upon; whose ideal of beauty is supposed to culminate in a clover blossom or a straight row of corn. I trust that these ideals may be modified in time so that the close relationship of the two will not only be considered compatible, but will be a fact of existence.

The landscape gardening that I wish to talk about is not a grand or expensive affair involving the necessity of a professional man to conduct or a large bank account to support it. Far from this, it is a matter of very little outlay, it is a miserably cheap affair. But water is cheap and so is sunshine. What among the most costly things you have would you exchange for these?

Hence the landscape gardening of which we shall talk has to do with such yearly, monthly, yes, daily modifications of our country premises as shall transform them into beautiful and attractive homes, render them more valuable as property, and while we do this we shall hint at the general principles of landscape art upon which these details are founded.

Why Shall we Beautify?

The first question that arises, the answer to which is our incentive to the adornment of our homes, is, Why shall we beautify? and I answer, first, for the beauty itself; and, secondly, for the influence that beauty has in completing a rounded manhood and womanhood. Accompanying the development of a tasty house, beautiful grounds, attractive shrubbery, or delicate flower borders, is another growth on the inside of the person devising these embellishments that is more lasting and valuable than the outside modifications that seem so beautifully transformed. This is the growth of refinement; something that we cannot measure by dollars and cents, any more than we can measure faith or love. But it has far more to do with the progress of civilization than the opening of the richest silver lead or the discovery of the largest diamond field. These go up and down with the supply, but the more refinement we have the greater premium there is upon its acquirement. We all see the necessity for more of it among our farming people; from their isolation there comes a tendency to neglect the schooling of the heart in the channels of refinement, and there is nothing that can so perfectly take the place of society and knowledge of its best molds, as close companionship with nature's beautiful life forms and the profuse employment of them in the adornment of a home.

There may be just as good a heart in the man who in answer to a favor says: "That's a good 'un, old fellow; if you want a lift call around," as in the breast of another who answers, "Thank you kindly. I trust I can return the favor sometime." But while we admire the generous impulse of the one, we are doubly pleased with the impulse and its delicate expression in the other. We cannot come in contact with refined people without unconsciously following in their wake and smoothing down the rough corners of our own habits. So it is in the development of beautiful grounds and attractive surroundings, every new creation has its effect for good upon the one that devised and moulded it. This in itself is a great reason for the adornment of our homes. Need I give others? I will suggest them. Thirdly, then, I shall name satisfaction of possession. This I admit is of much less consequence than the other. Still we

are so constituted that the satisfaction of having things is a stimulus to get them. Of course the value of the acquisition has much to do with the weight of this incentive. For instance, the man who has a beautiful wife, aside from all the pleasures she may bring to his home, takes a great deal of comfort in the thought that she is his own. (This instance is for my bachelor auditors.) The woman who grows a beautiful house plant and by her skill succeeds in making it a model of symmetry and floral wealth has no little pleasure in the fact of possession.

The value of this pleasure does not usually depend upon what the acquisition will bring in the market, but rather upon our interest and effort in the getting of it.

Again, the greatest good comes to us through the development of all our faculties, and if the germs are given us, why not give them opportunity to grow and thus fit us for a wider field of work and appreciation of what is created? In the work of landscaping the farmer brings into use a new set of faculties, and he is given the opportunity to make himself a broader man.

A few years ago while land prospecting with a friend in Kent county, after passing across the fields for some distance we came into a tangled woodland undergrowth. We pushed our way through this for some distance, and to make a bad matter worse we were obliged to cross a long stretch of mire and sphagnum which tested our powers of endurance to the utmost. Just before we emerged from our difficulties we ascended in more open woodland, quite an elevation, and at its summit we came upon the most beautiful landscape I had ever seen. In the distance hill overtopped hill until the wavy outline of blue alone indicated the character of the country. Near to us in a quiet valley lay the Grand river, pursuing a winding course and reflecting to us the sun's rays in such a manner as to convey the impression of a river of silver. Here and there in the valley and on the hillside were farm houses scattered at irregular intervals, and the alternations of woodland and cleared fields gave a beautiful variety to the distant view. But best of all, at the foot of the hill upon which we stood, snuggled in a quiet retreat, almost surrounded by natural groves of oaks, silver maples and aspens, lay a calm little sheet of water. It was the embodiment of quiet, modest beauty. I had but just taken in the outline of these beautiful views when the rough salutation of a Tenton brought me to a realization of the ground upon which I was standing. I was unconsciously treading out a few heads of clover in my endeavor to grasp the grandeur of the scene before me. He unceremoniously acquainted me with the fact, and to mollify him I spoke of the favored position he occupied in commanding such a view. "Yaas, it was purty nice, but I can show you sometings dat is petter as all dat, right py my house." Glad that he was turned from the clover-seed matter, I followed, to find, first, that his house, which was very snugly built and indicated a thrifty farmer, was so placed as to have the barn between it and all this loveliness I had admired, and imagine my disgust when I found "his ting vat vas so nice" was nothing more than a pen full of fat pigs,—evidently the pride of the farm and joy of the household. The front porch, where my new friend sat and smoked, looked out upon this yard of swine, and his ultimatum of the beautiful lay in their fat sides. What this man lacked I would have every farmer cultivate, and it is for the development of the faculty of appreciating the finer beauties of the world that I submit this answer to the question, "Why shall we beautify?"

Simply as a matter of benevolence we should beautify our premises. I would

not have you think that I mean by this that we should make our places tasty and attractive for the sake of showing off to other people our ability in this direction, but for the same reason we would assist our neighbor in taking off his wagon-box. He is not able to do it alone, and we can help him. There are hundreds of those who pass your doors annually that cannot fix up a home and yard because they have none, but who can keenly appreciate the neatness and attractiveness of yours.

Only a few days ago a man said to me: "I passed your mother's yard a great many times last summer, and never once without stopping to admire a magnificent bunch of magenta phlox, and I have seen dozens of people doing the same thing." This is a simple instance of how much pleasure we can grant others by the adornment of our own premises. The people did not know that the beauty of this phlox was largely due to a principle in landscape art that was there exhibited, viz.: contrast of color, for a dark evergreen stood near and heightened the effect.

Lastly, there is a money value in the making of a beautiful home that will pay a large interest upon the outlay, if the labor be reckoned at its highest value. You may not want to sell, but if you are a thrifty farmer and a business farmer you wish to know at the end of each year what are the profits of your business, and if you find there is not a very large bank account as the result of the year's work, there is a great satisfaction in knowing that your place has been improved in selling value a considerable percentage through the exhibition of tact and taste in making the premises attractive. The merchant, in his invoice, takes account of his samples and the contents of his show-window: likewise the farmer should count in the embellishments of his home as a part of his capital stock.

Then if the worst comes and it is found necessary or desirable to change locations, the enhanced value of the property through the exhibition of taste in adornment pays in the cash receipts. Beautiful situations are always more marketable at advanced rates than poorly kept farms at a discount. It pays them liberally to make a home beautiful.

In the outset of fixing up a place one thing must be borne in mind, conspicuously: that utility and beauty are not antagonistic elements. The path that leads to places of work would not be beautiful if it were not direct, while the one that leads to the flower beds or the grove may be filled with delicate curves, and we follow admiringly, appreciating the nicety of the turns, because when we go there we are walking for pleasure, not business, and a little matter of added distance takes nothing from the charm of the promenade.

Anything loses or acquires beauty through association, and we should care for this scrupulously. The weeping branches of the elm in the hollow make it a beautiful object in the landscape, and when we observe the tips of the weeping limbs, almost or quite sweeping the surface of the brook beneath, we enjoy the delusion that it droops to bathe its branches in the cool water. But were that elm placed midway between our house and barn, where upon every occasion of passing we must make a detour to avoid the limbs, or by passing under have our hats knocked off, and hair pulled every time, the beauty of the weeping branches would be all lost, and we would dub it a nuisance. Another point to consider is that the price of beauty is care, unceasing care and attention. If by the cultivation of taste this becomes a delight, the care is only an added enchantment to the pleasure of development.

In the arrangement of grounds there must be unity of action on the part of

the whole family in order to accomplish what is most desirable, viz. : congruity of parts. To illustrate, a place I now have in mind, and no imaginary one either, has a delightful frontage ; the lawn is smooth and green, the evergreens tastefully grouped, climbers are delicately turned about the verandah posts, and flower beds just at one side, neatly kept, give an air of loveliness to the whole yard. But every day as I pass the place, when just beyond the yard fence, I cannot help but catch a view of the lane which leads to the barns. It is filled with an aggregation of indescribable odds and ends, such as could accumulate nowhere but on a farm, with a generation for time. At best it is a muddy, filthy, slovenly, ill-kept alley. We lose all the effect of the beautiful yard in that lane, and the loathsomeness, rather than the preceding beauty, haunts us. The story is told when we say that the mother and children have charge of the first part of the home surroundings, while the head of the family believes in having everything handy on the farm. But unity of action must move in the right direction, for I know another farm where the man and wife, and for that matter the whole family, are actuated by the desire to have everything handy, and everything upon the place bears the impress of a total lack of taste or order. They spend enough money in trees, plants, trellises, and ornaments, but somehow each new one adds another to a most unfortunate combination. I will particularize a little in my hints, and first touch lightly upon

The House.

I am not a house builder, and do not purpose to give instructions in any of the details, but just mention a few points that come within my province.

Although the house is the main thing upon the farm to which every thing else should be tributary, still it should not be so grand or elaborate as to be out of character with the surroundings. If one has only money enough to build a large house, and its connections must await a season of greater prosperity, it is far better to build smaller and start everything at once. Nothing looks more out of place than a great, glaring house with no appropriate accompaniments.

I have seen an old, weather-brown house so relieved by climbers and plants as to be really beautiful, and because one lives in such a house is no excuse for not exercising taste in landscape gardening.

The first thing to consider in building a house is to have it so arranged that the living-room will be the most beautifully located of all. Our finest views should be from the windows where we do the most of our looking, and we should avoid the plan of having a large house and then living entirely in the back kitchen, the view from which commands simply the wood-pile, the drain, and the clothes yard. The house that is most in keeping with the farmer's business is a quiet, unostentatious, home-like building, devoid of all appearance of showiness and fancy paint or moulding. The farm-house is close to nature and should accord somewhat with the trees, the turf, the rolling ground, and the flowers. There is true refinement in modesty, and a wonderful lack of it in glaring gaudiness. The farmer can choose a far better way to exhibit to the world his prosperity,—if he so desires,—than in flaunting it abroad through a great house covered with “gingerbread and flumadiddles.”

Quite an important element in the building of your houses is such an arrangement of the exterior that it may be an index to the interior; this to guide the stranger at his approach that he may enter properly. Only the other day I was reminded of the propriety of this; for, upon entering a yard, I brought my best judgment to bear upon the matter of going into a man's house, and the

result of my decision was that I was shown through the wood-shed, then the kitchen and the dining-room to the sitting-room, where I was to stop. This is unpleasant and embarrassing, and can be easily avoided in the planning of fronts and arrangement of walks.

The Lawn.

There is nothing connected with the farm-house in its embellishment that gives it so much character as a beautiful lawn. Fill your front yards with roses, snow-drops, clematis, beds of annuals, shrubbery, and evergreens, and still nothing is so neat and attractive as a smooth piece of velvet lawn. There is a nicety about it, if well kept, that pertains to nothing else. Yet how few rural places can boast of a fine piece of smooth green. The truth is, very few people understand how to make a lawn, and seem wonderfully slow in acquiring the necessary information. A lawn, to be perfect, should be green all summer; this, in our arid climate, can only be approximated without the accompaniment of a good head of water to give it a drink occasionally. I say approximated, because we have a means of partial control within our power; this is in the preparation of the soil at the beginning. It is quite customary to stir up the soil a few inches, and, through the agency of a great deal of hard work, cover the surface with sod brought from some old pasture or roadside. With all due deference to the "professionals" who follow this method, I say this is a very poor method. In the first place a very dry summer will destroy the whole of it; and, in the second place, ten chances to one, under the most favorable circumstances, there will be many bare, unsightly places. The ground, of whatever consistency it may be, should be stirred,—not four or six inches only,—but, if possible, two feet in depth. It is a big thing to do at the outset, but it is once for all. Then, if the soil be light, give it clay muck, and manure; and if heavy, give it sand, muck, and manure,—not a thin scattering, but a generous, open-handed covering. The muck and manure, as you see, are common quantities in both equations. Too much attention cannot be given to the smoothing of this; and, in all this outlay, quiet your conscience with the thought that it is to be done but once. With this deep foundation and smooth surface, a sprinkling of seed, and a cheap lawn-mower, we are in a condition to produce a premium lawn in one season. I am inclined to denominate all the advertised mixtures of lawn seeds as humbugs, and recommend in their place an equal mixture of Kentucky blue-grass (June grass) and red-top; and sow it thick,—five bushels per acre is none too much. All this do in the fall if possible, except the sowing of the grass seed, which should, in our climate, be done early in spring. Do not sow oats, or rye, or buckwheat with it for a shade; this is all nonsense; it requires no shade, and there is scarcely a chance of failure. As soon as the grass is sufficiently started the mower should be used at least once a week in the growing season. A surface dressing of fine hen manure or composted night-soil should be given at least every other year to keep the soil in good heart. Upon this plan any one can have a beautiful lawn who has a patch of ground a rod square. It should not be forgotten that a lawn, to be kept nicely, requires as much attention as the same area of flower beds.

Walks and Drives.

Do not have any walks nor any drives unless they can be cared for properly. Men often become disgusted with trying to keep a walk in repair, and allow it to grow up gradually to weeds and grass, thus producing a most unsightly ap-

pearance. People make mistakes by not starting right, and make themselves a great deal of unnecessary trouble. I know a man who thought he would have something nice in the way of a walk. He sifted out some nice gravel, cut a place for his walk two inches deep by three feet wide, and filled it with the gravel. The first season he became disgusted with the whole arrangement, for the weeds and grass were well nigh overpowering. To keep these down he put on a generous supply of leached ashes. The first good shower rendered these so sticky that the grass was far preferable to walk upon, and the utility of his model path was entirely wanting. The next season he was going to profit by this experience, so he took out the gravel and ashes and laid a brick walk. This looked very nice for a time, but the infamous grass got started between the brick, and from here found it almost impossible to eradicate it. The final method adopted was a little good earth upon the brick, in which the grass caught readily, and now his path is a rounded piece of turf extending across the yard from door to gate.

The right method is to put the most of this work into the beginning. Dig out the space for the walk or drive to the depth of nine inches; and, if stone are cheap, fill in a layer of stone at the bottom; then cover with gravel, rather coarse, to within an inch of the top, and finish with finer gravel. If there is not clay enough in the gravel to pack it, a little must be added. This, once completed, will last forever and require very little care.

In the arrangement of walks and drives keep in view the positions for convenience, but remember that a curved line is a line of beauty, and where it will not conflict with business allow gentle curves to enter, but never make a curve without some apparent or real reason for it. If a slight curve is required for beauty, and no tree is in the way to suggest the deviation from a straight line, put one there, or a group of them.

It is quite noticeable that the paths made by animals across the pastures down to the spring or into the yard are nearly always lines of beauty. The first time a farmer drives into his yard by his house to the barn, he makes, while he avoids obstructions, a very direct course, and still it is in curved lines; and when a would-be practical man objects to my plan of curves, I can only tell him in answer that when he follows a course without thought he takes a curve himself, without the aid of liquor, too.

Then let your business walks be direct, but where you are to loiter for pleasure, among flowers and shrubs, or down to the stream, or into the grove, let there be curves of beauty hidden from each other by the plantings, and giving constant variety and entertainment to those who loiter.

Trees and Shrubs.

Do not think your landscape will be beautiful according to the sum of money expended in foreign trees and rare exotics. To be sure there is a certain kind of gratification in new and rare things, but to me and all you who delight in our native woodlands, containing as they do a greater variety of beautiful things than does any other country or clime, the trees and shrubs brought to our grounds from the woods, the lowland, the highland, the swamp, and the river-bottom, have greater charms than all others. Here it is, too, that we can bring study of the best order into our work. The planning of little nests of shrubbery that shall contain a good proportion of our native sorts, in such a manner that all will thrive; and to know them so well that each variety can be pointed out, is a beautiful study that relieves the tedious process of transplantation. Then

how delightful it is to convey to our own premises the unparalleled beauties of our Michigan autumn foliage.

There is opportunity for the exhibition of delicate taste in the arrangement of a bouquet of flowers so that each form and each varying tint and shade will augment the beauty of the group, but it takes more skill and there is a greater charm in arranging our groups of trees in such a manner that the different types of form will not, by juxtaposition, injure each other, and so that each hue of summer and autumn will be in its position of best effect. It is a skill not to be learned in books, not to be taught in a lecture, but to be acquired by a careful acquaintance with the chapters of the book of nature, that are so replete with the knowledge we need. In adjusting trees with rich autumn tints it is desirable that somewhere close at hand,—either in front or behind,—there be the rich color of the evergreens for contrast. A low spot can be beautifully and appropriately planted to the drooping trees; the willows, the elms, the water maples, and larches,—all may be made to contribute to a beautiful effect.

Single trees, placed as specimens on the lawn and kept neatly pruned so as not to injure their habit, can be so selected and placed as to give individuality to the place; and this is what we are to seek after. Each family stamps its individuality upon the place it occupies, and if this accords with principles of taste, the fact of its originality gives beauty and satisfaction to the premises.

Our native trees are not well appreciated. A tree agent will come around and exhibit his plates of trees with foreign and high sounding names, for which we pay great prices, when in our native forests we can find far more beautiful ones that we know we can transplant and warrant to be hardy. It would be far better if the tree agents would exhibit plates of our best native trees, well grown, putting to them their scientific names. They would make just as much money, and the people would not lose so much by it, even if they could get the same specimens in their own wood lots.

No climber with a foreign title can ever equal our common Virginia creeper, growing so abundantly in our own woods, and no plants can equal our maples, elms, lindens, ashes, and oaks, among trees; our azaleas, kalmias, spice-bush, leather-wood, witch-hazel, alders, and red-osier, among shrubs; and our pines, hemlocks, spruces, and cedars, among the evergreens.

What shall I say of flowers? Some of us are drawn to them as by a magnet, and still are easily satisfied. It is not the costly or rare ones we crave, but our common lilacs, mock orange, Japan quince, phlox, pinks, verbenas, asters, stocks, candy-tuft, sweet william, roses, and columbine. And where shall we put our flowers? Not in beds dotting the lawn here and there. No, don't for anything spoil the beauty of that velvet carpet. Have the flowers on one side. Make them into borders or beds as you choose, but certainly have plenty, apart from even these, that you can, during their season, cut from them to embellish your mantel, your windows, your dining-room, and your kitchen. I say kitchen, because, for the farmer's wife, a large part of the time is spent here, and the flowers are for use and enjoyment where they will do the most good.

Many of the dwarf evergreens are beautiful to employ as centers for flower beds, and make a permanent position about which to arrange colors.

Do not think because you have a climbing rose, a clematis, a honey-suckle, or a frost grape, that you must make an elaborate lattice-work or trellis. Let one climb up the corner of the house, another the veranda column, another over the door to the side entrance, and put one by the gate-post, by an old oak

that you hate to part with but which looks rather scraggy. Make everything appear as natural as possible; it is in good taste and a matter of economy.

It isn't to be supposed that everything about even the best of farm-houses is open to the inspection of everybody. There is the wood yard, the clothes yard, and outbuildings that it is desirable to screen from view. Evergreens are just the thing to employ. The spruces and the pines grow rapidly and can be so placed as to make a most natural group and answer the other purpose as well.

One word more about planting. Give as much variety to your grounds as is possible, and avoid right lines. These are stiff and monotonous. If you have a stilted tree like the Lombardy poplar, hide by planting at its base, the lower part of it; and if you have a low grower that you wish to give a place of prominence put on a rise of ground.

The Expense.

And now how is the farmer to meet the labor and expense of all this? I know the farmer's hands are always full; he works early and late and has little time for recreation, but I beg leave to offer three suggestions: *First*, The farmer should be more of a business man, in order to gain time. The merchant has his business hours, and sticks to them religiously. The mechanic has no time during his work hours for visiting or entertaining friends. The farmer, too often, is ready to stop his work and lean over the fence by the hour, talking politics or telling stories. His city friends come, and he gives the day to them; an auction calls him away to spend time and money. When the farmer makes his business a system, and looks upon his time as so much money, then he will have more time. His recreation will be guided by a plan, and his landscaping can be his recreation. It is better than going berrying, or fishing, or hunting. But mind you I do not take exception to even these, if the time can be spared.

Again, might not some of the little vices of using tobacco and beer be supplanted by interest and money put into the home grounds, and that, too, with a good deal better effect and more lasting enjoyment?

Once more, I offer this as a suggestion: that the adornment of the home grounds be a family work in which every member is to take a decided part and interest. The children of a well ordered family might perform nearly all the labor connected with the lawn and the flower-garden. The pruning and the cultivating can be done by them, and be called amusement; and how rich will be their reward! In the growth of each species they learn its habits and its value. In the adornment of home they are adorning their own characters with graces that will develop with the years and grant to them influence for good; and farther on, when they leave the old home and are taken from the pleasant associations that surround it, they will have that laid up in memory which will come back to them, softening their hearts and declining years of life with the beautiful home of childhood. The beauty of home that is of the children's making is not wasted in one generation, but children and children's children are tempered by it, and no man can compute its value. How grand and beautiful, and yet how simple in its conception and consummation.

Mr. A. C. Satterlee, of Greenville, read the following essay on

WHEAT CULTURE.

Wheat has never been found growing wild, but it is said to be perfected by constant cultivation from a kind of grass. It has always been used as an article

of food, and is everywhere regarded as a production of great importance. It can be successfully cultivated in countries that present a great diversity of soil and climate, which is not so much to be wondered at, as there are at least 150 varieties, some of which are much more hardy than others.

Our own State seems admirably adapted to its production, as the flour manufactured from Michigan wheat has won a high reputation not only in our own eastern cities, but it is also favorably known in the European markets, and we have come to feel a just pride in the quality of Michigan wheat.

Our State Legislature of 1875 must have recognized this when it passed an act to regulate the sale of wheat and to prevent the sale or offering for sale of wheat not grown in Michigan as Michigan wheat, and to prevent the mixing of foreign wheat with the Michigan product, fixing the penalty for the violation of the act at not more than \$1,000, and not less than \$200, or by imprisonment in the county jail for six months or by both fine and imprisonment.

There are few topics of greater importance to the Michigan farmer than that of wheat raising, and half the ideas it suggests cannot be presented in one brief essay. It is my design to give only a few practical hints on the subject, leaving a chance for a theoretical essay to those who can produce a fine display of wheat on paper by some plausible theory, but can raise only half a crop on the best of soil. Although it is invaluable to understand the constituent elements that enter into the growth of the plant, yet as all do not and cannot analyze the soil it seems more necessary to speak of the duties and neglects common to putting in a field of wheat.

Wheat requires a rather dry soil, as it must receive all the heavy fall rains and remain in the ground during the frost and snow of winter, the thaws and freezings, and the rains and melting snow of spring. Heavy clay lands are usually expected to bring good wheat, yet our light sandy soils also produce an excellent yield. New land generally gives better returns of wheat than old land, yet if many of our old exhausted fields received the enriching they ought, the average yield per acre in this State would be doubled. There has been much experimenting on the best kind of fertilizers for wheat. Much valuable material is wasted on many farms every year that should be carefully thrown on the fields, and there is much more that might be procured at a trifling expense. I have used ashes mixed with plaster as a fertilizer, and know they are much more valuable than the sparing way in which they are used seems to indicate. They are, however, gaining favor with those who have made liberal use of them upon their wheat fields, yet often when the properties of a fertilizer are understood it is improperly applied. Sometimes too great a quantity of a certain property is supplied the plant, thereby stimulating too large a growth of stem and leaves. The materials for both stalk and grain should alike be taken into consideration.

Farmers, do not sell your straw and cheat your fields of the necessary material for the growth of the straw of your next crop of grain. It is worth more to you on the farm manufactured into manure. There are some farmers who cut all the straw they use for the bedding of stock in the same manner as for cut feed, claiming it absorbs the liquid of the stables to greater advantage and is a valuable ingredient in the compost drawn from the barnyard. It would be commendable in every tiller of the soil to experiment with the various means at his command for enriching his land. Ashes, plaster, bone dust, salt, lime, and grain, as well as the barnyard contents, should be resorted to even by those possessing farms of the best of land, for heavy crops are the only ones that are

really profitable, and they cannot be produced if enriching the soil is neglected, though much may be accomplished, in my judgment, by judicious fallowing of the ground. And this brings me to speak of plowing and preparing the field for the reception of the seed, although I can scarcely say enough on the subject of supplying the soil with the materials we are constantly demanding from it.

Deep plowing is of the first and greatest importance. Many farmers think it necessary to plow the land twice to procure a good crop, but unless the land is very stumpy I should not think it necessary, and if the field is free from stumps, as every field should be as soon as possible, I should recommend one deep plowing, and then a thorough use of a wheel cultivator. But if it must be twice plowed, it would be well to begin on the outside and plow around the field toward the center, then begin the second plowing in the center, working toward the outside, thereby leaving the field as level as possible for the use of machinery. It may not be amiss to say that many failures may be attributed to hasty and careless plowing. The furrows should be straight and of uniform width and depth, using the jointer when plowing sod. But the second plowing would not supersede the use of the cultivator, as there is the greatest benefit to be derived from its unstinted use, thus exposing fresh surfaces to the action of the atmosphere and keeping the grass and weeds in check by the constant stirring of the soil. If the soil is inclined to be lumpy, it will be necessary to use a roller before commencing to sow the wheat. It should be brought into use again in the spring. My plan is to sow grass seed on the wheat (in the spring), then harrow the field and afterwards roll it. It is said that the harrowing and rolling in many cases kills the fly, which in some localities is so destructive to the wheat crop. I read, not long since, a caution from an eminent agriculturist against too much working of the land, as it might render it too light for raising a good crop of wheat. I have never known of such an instance. On the contrary, there is a tendency to work land too little.

I have seen two crops raised on the same field with but one plowing. I refer especially to the practice of sowing wheat on corn ground, only making slight use of the cultivator after the corn is drawn off. And, indeed, there were fields sown last fall with the corn still in the shock; I will venture to say the yield from the fields will not be nearly as large as their soil is capable of producing. I know from experience that a heavy return of wheat may be realized from summer-fallowing corn ground. But I have never tried the other method, and hope I shall never be obliged to. I remember seeing a field of wheat sown on the corn stubble without plowing, and the owner confidently expected a good yield, but the result was what might be anticipated, about five bushels per acre, and that on land capable of producing at least twenty-five bushels per acre, with only decent treatment.

I once asked a farmer his object in sowing on corn stubble. He replied that in so doing he could get a crop each year, when if he should wait and summer-fallow he would only receive two crops in three years. His reasoning was quite correct, of course, if the land was strong enough to raise two crops with but once plowing. But I have yet to see the land that will endure that kind of treatment long, with as little enriching as farmers usually give it. It seems to me that one trial of sowing on corn stubble would be sufficient to convince any farmer that it would be a better plan to raise twenty-five or thirty bushels per acre with fallowing rather than five or ten bushels sown on corn stubble. Many farmers do not consider that it requires just as much seed where the return is but five bushels per acre as where it is twenty-five, while the cost of harvesting

the latter, in many cases, is no more than for the former. And most of us, "poor humanity that we are," have sufficient pride aside from the matter of dollars and cents to prefer reaping a large crop rather than a small one. There are two methods of sowing wheat in common use, but drilling it in is far preferable to sowing it broadcast. The use of the drill decreases the tendency to winter-killing, because the wheat is all well covered and has a greater uniform depth, and in using the drill it requires less seed per acre than when sown broadcast.

There is no subject, however, on which there is more difference of opinion among farmers than that of the amount of seed per acre for a successful crop of wheat. In some cases a fine yield has resulted from sowing only one bushel per acre. Again, two bushels have not been found more than sufficient, and by way of experiment three, four, and five bushels have been used per acre, with various results. It is safer to have too much seed in the ground rather than too little, as there is then more prospect of a fair yield if the season should chance to be a most unfavorable one for the wheat crop. It is but reasonable to expect that he who sows sparingly shall also reap sparingly. The quality of the wheat sown is of the greatest importance. Farmers cannot be too careful in sowing none but the very purest and cleanest seed, nor too particular in sowing that which has not been attacked by any of the diseases to which wheat is liable, such as mildew, smut, rust, etc. Wheat that has sprouted should never be sown, as grown wheat will not produce a good yield of the best quality.

But few of our farms, probably, have ever yielded as much grain per acre as they are capable of producing, and for this reason it is seldom that the extra efforts are put forth which are necessary to secure a heavy return. The land should be abundantly supplied with phosphoric acid, potash, and all the materials that enter into the grain and straw of wheat.

A proper rotation of crops should be observed, as this materially contributes to the success of every kind of grain. Wheat extracts quite different materials from the soil than do green crops. And every farmer knows that it is not good policy to continue sowing wheat year after year in the same field, as the soil is soon deprived of the particular ingredients which that plant absorbs. By a wise rotation of crops, the soil is enabled to gather to itself certain properties while being deprived of others.

It is not of the first importance to sow wheat bearing the most popular name. One kind takes the lead in one locality, while an entirely different variety is more popular in another. The standard varieties in this locality are the Clawson, the Gold Medal, and the Deihl, while in another county the White, Flint, and Canada Club were extensively sown last fall. All are excellent varieties, and the failure of a bountiful harvest must be attributed to some other cause rather than to the kind of wheat sown.

Many farmers complain year after year of partial failures of their wheat crop, attributing their misfortunes to a drouth, or to too much rain, or to the insects, or to the wheat being winter-killed—to any cause, to everything or anything, rather than to want of care in performing their work. But it is well to remember that those very things to which poor success is attributed would not have affected their fields in most cases if proper attention had been given to every detail of their work, for disease, and insects and drouth more readily affect poor, thin, unhealthy fields of wheat; and we may say that slack farming often invites the very evils we deplore.

Enough might be said, to form matter for another essay, of the diseases of

wheat and the insects liable to injure this grain; but, as already hinted, these may to a great extent be avoided by proper management.

In conclusion, let every farmer who desires an abundant return from his wheat field see that there is a judicious rotation of crops; that his ground is suitably enriched, thoroughly worked, kept free from weeds and well pulverized up to the time of sowing. Let a liberal quantity of the very best seed he can procure be well drilled in, and I think he will seldom fail of a plentiful harvest under the favoring skies of the State of Michigan.

While we think with pride of the vast resources of our State, of its wonderful mines of rich minerals and of its millions of acres of rich pine, still it is upon its fertile soil that we farmers turn our eyes with the greatest satisfaction. Let us, while we still keep up the reputation we have won for the *quality* of Michigan wheat, see to it that by high cultivation we double the *quantity* of this valuable grain for every acre that we sow.

An essay was next read by Mr. A. G. Stockholm, of Eureka, as follows, entitled,

"HINTS TO BEE KEEPERS."

Honey, the product of flowers and leaves, esteemed and prized by mankind as a luxury, is collected by the bee from the garden, field, forest and wayside, and is stored by it as food for itself and as a delicious confection for man. Working for nothing and boarding themselves, yet comparatively few profit by the labor of bees. To one traveling over the country who gives thought to the matter, it is really surprising to note how few bees are kept.

That keeping bees with proper management is profitable there can be no doubt. Probably there is no business pursued by man, where labor and capital are employed, that pays so large a per cent. on the capital invested and labor bestowed.

That all persons can handle bees successfully is somewhat doubtful. It seems that there are persons so constituted that it is almost impossible for them to establish friendly relations with the bee. But the number of such is small.

Lack of success on the part of those who have experimented in bee-keeping may be stated as the reason why this business is not more generally followed. Why are there so many failures in bee-keeping? The experienced farmer, in preparing the soil for a wheat crop, understands that, in order to succeed, he must have it in the best possible condition; that it will not do merely to plow the ground in the spring, letting it lie until fall for the weeds to riot in, and then sow the grain among the rubbish with the expectation of reaping a crop the coming harvest. Nor does the experienced apiarist place his bees in some corner or nook of the yard, remote from the dwelling where they will not be noticed for weeks. Yet this is the system pursued by those that fail, and then they wonder why it is so. Neglect or mismanagement, and ignorance in regard to what is required, may be assigned as the great cause of failure with the inexperienced.

Neglect in the spring time is a cause of failure. Bees become much reduced during the winter under the most favorable circumstances, and many stocks will scarce make a live of it unless assisted by their keeper.

Then, as soon as the weather becomes warm enough in the spring, give the hives a thorough overhauling. Clean out all the dead bees and everything that may be offensive, cutting out all mouldy comb. In order to do this readily one

should have a rack hive, which need not necessarily be expensive, but should be convenient.

A simple box-hive, made in a manner that racks for the comb may be placed and removed easily, is all that is required. If it is desired to receive the surplus honey in boxes, the hive should be made two-story, the upper story large enough to receive the boxes.

Then little attention need be given the bees until the time for swarming arrives, except to feed them sparingly on sugar or syrup if the season be backward, sufficient only for the present wants of the bees, especially if the extractor is intended to be used during the season. For if the comb is filled with syrup made from sugar, you are sure to get some of it back when you extract, which, if it is designed for the market, would hardly be the fair thing, and bring your apiary into disrepute and injure future prospects in the market.

As soon as the bees commence to collect honey in quantity, or as soon as the flowers that produce honey appear, place boxes in position. Some prefer to wait until after the first swarm; but this is a mistaken idea, because often much honey is made before swarming, and gathering honey does not detain swarming.

Some time in the month of June, in this latitude, swarming will take place, unless the apiarist has previously made an artificial division of colonies. It is better for the inexperienced bee-keeper to swarm in the natural way.

During the swarming period the apiary must be regarded with watchful care, especially if bees have been clustering at the entrance of the hive.

After leaving the hive and flying about in the air for a time, they generally cluster on a bush or a limb of a tree in the vicinity. Now is an exciting time if the bee-keeper is a novice in the business. It might be well for him to protect his face with a veil or a piece of mosquito netting. As soon as the bees have become settled, take the hive prepared for the occasion, place it on a platform made of planed boards, place all on the ground directly beneath the bees; or, if they are high enough from the ground, place the hive on a couple of saw benches; raise the front of the hive a little, draw the cluster of bees as near the entrance as possible, give it a sharp, quick shake, and the bees are at the entrance; with a little green bush gently crowd them toward the hive, and soon, if properly managed, the bees will all be in the hive; then remove the hive to the place you wish it to occupy. Should the new colony manifest a desire to leave, place a frame of worker comb in the center of the hive, and it will be a rare thing if the swarm leaves it.

Now the old colony requires attention. It will be queenless several days unless a new one is given them, as is practiced by skillful and experienced apiarists. But an amateur bee-keeper will cut out all the queen cells but one, the object of which is to prevent after-swarming, which is not desirable or profitable.

After the lapse of twelve or fourteen days, again inspect your old colony, for it sometimes happens that the young queen while abroad meets with an accident and fails to return. In this case another queen must be supplied by inserting another queen cell with an embryo queen, making room for it near the center of the hive.

But if there are no extra queen cells, then in brief a worker must be promoted to the dignity of a queen. It is thought an embryo worker may be developed into a queen by a change of position of the cell of the worker.

Now, in order to provide a queenless colony with a queen under difficulties heretofore described, all we have to do is to take a piece of worker comb, with fresh laid eggs in, from a hive that has a fertilized queen, attach one of these

cells to the comb of the queenless colony as near the center of the hive as possible in a vertical position, and the work is done, the bees being only too glad to do the rest. It will soon be a queen cell and produce a queen as good in every respect as one raised in the natural way. The experiment has often been tried and proved successful.

If, however, you find that the queen is on duty, and become satisfied that she has been abroad, then all is well, and but little further attention need be given the old colony except to give it an occasional glance to see that it is all right, and to remove and replace boxes as fast as they are filled.

But little remains for the apiarist to do from this time until the honey season is over. When the flowers are killed by the frost and the natural resources of the bee cut off, having removed all honey boxes, feed heavily. Place syrup made with sugar and water everywhere about the premises, keeping the bees to work as long as the weather will permit, overcoming in this manner the disposition to rob one another, and induce the queen to keep breeding besides supplying any deficiency that may be required to carry them through the winter.

The probability is that the bee seldom if ever freezes to death; but that frost is indirectly the cause of the destruction of many colonies of bees, there can be no doubt. The great trouble in wintering in the open air is water collecting on the comb by the respiration of the bee condensing and becoming frozen and remaining so for a protracted period, thus preventing the bee from feeding. The cells containing the honey being as hermetically sealed as if placed in a glass jar with the top screwed on, ultimately causing the death of the bees by starving. To guard against this as far as possible, give plenty of ventilation, especially at the top of the hive, leaving the entrance to the upper chamber of the hive open for that purpose, an opening made into that by boring an inch hole and covering with wire cloth, thus giving a chance for the damp air to escape before it becomes frozen to the comb. I have practiced this method for the last ten or twelve years with good success.

In regard to wintering in cellars, if one has a good dry cellar that can be devoted entirely to that purpose, where the temperature would not vary materially from about three degrees above the freezing point, none need fear to place bees there, for the best results may be expected, and almost surely follow. But before placing them in the cellar where the winter supply of vegetables and provisions of the family are stored, hesitate a little. The burnt child dreads the fire, and perhaps I cannot say anything more to the purpose than to give my own experience.

Some eighteen years ago I thought I would like to try the experiment of keeping bees. One of my neighbors having a hive of bees that he wished to dispose of, I purchased it and commenced operations. It gave me two very respectable swarms during the season, besides about thirty pounds of surplus honey in boxes that I placed on the top of the hives. They were not rack hives. I felt somewhat elated over my success. I had read in some book on the bee that to secure the best results one must winter bees in the cellar, so when the cold days came on, I consigned them to their quarters in the cellar under my house, and thought all was well. About the first of February I visited them, tapped on the hives, and got a faint response. I thought things were progressing finely, and said, "Sleep on, little birdies, it is storming without and cold. When the warm days come and the blossoms appear, we will take you out in the air. When recuperated by your long rest, you can go to work with a will." About the last of March, the weather being warm, and noticing some bees flying around, I thought I

would take my bees out. I went where they were. All was still. I tapped on the hive; no answer. I thought they must be slumbering. Yes, they were sleeping the sleep that knows no waking; and they are sleeping still. There were cabbages, turnips, potatoes, pork, squash, and pumpkins in the cellar; and, if I should consign my bees to such a place to winter again, you no doubt would call me the biggest pumpkin of them all.

Now, in order to become a successful apiarist, one must couple theory with practice. Get all the information you can from books and the experience of others. Apply to yourself what meets your needs, discarding the rest. And there is no reason why all, or nearly all, should not succeed in the undertaking. To the beginner it is very essential to have some good work on the bee that goes into details, giving a full description of the work to be done. Quinby, Langstroth, Harbison, and others, are all good; but there is a little pamphlet entitled *Manual of the Apiary*, written by Prof. A. J. Cook of the Agricultural College, which no bee-keeper who wishes to succeed can afford to be without.

Next an address by Prof. A. J. Cook, as follows:

“IMPORTANT MISTAKES MADE BY BEE-KEEPERS.”

The profits of rational bee-keeping are little understood, and if stated, would be still less believed. Since keeping bees,—if I except disaster in wintering, which has only occurred twice,—I have never failed to secure 200 per cent. net profits, and have often realized over 300 per cent. I fully believe the losses need not be repeated.

But granting that these are occasionally imperative, with the combs and honey still left at my disposal, I could purchase again in the spring, and still secure 100 per cent on my outlay. This is no guess-work, but a fact, built on the secure foundation of past experience, and can only be denied on the ground that there is to be a revolution in the affairs of bee-keeping. The world is coming more and more to disbelieve in revolutions.

But, say you, such results are not common. The apiarists of our country are not the millionaires, nor indeed have their bank credits been such as to occasion wonder or even remark. But, mind you, I said *rational* bee-keeping. Is it not true that most bee-keepers make this an avocation, a mere supplementary pursuit, which, though they often admit it brings the best returns, still receives only the fag-end of their time, thought, and energies? Again, a large per cent. of the bee-keepers let the apiary run itself. They give it no thought, no study, and very little attention. They cannot afford to take a bee journal, and as for reading bee books they have no time and less inclination. What wonder their song is burdened with loss? and what wonder that apiculture, which has to carry such weights, loses prestige among employments? Just as with farming, or any art or profession, where the representatives are ignorant or unthinking, she loses caste. To be sure, we have very many laborers in this field, and I am glad to know that the number is increasing, who, like Adam Grimm, love this vocation, and make it a continual subject of thought and study, I am glad to know that such men are also following in the wake of the one already mentioned towards the haven of competency.

The merchant, even with the closest attention to business, the utmost caution and the best study of the markets, treads an uncertain road; the lawyer and the physician find the walls of competition so high that success seems problematical, even with the severest thought and closest study; while the apiarist, if he will only study to know his course, thinks that he may never miss his bear-

ing,—and this very thought and study will yield a double blessing, in that it brings rich entertainment,—he will be almost sure to win success, and that too with but little labor.

There are many breakers that stand in the way of the ignorant and unthoughtful apiarist, two of which it is my purpose to present on this occasion. And first I will speak of

Queenless Colonies.

It is well known that a good queen will lay upwards of 2,000 eggs daily; and as 20,000 to 30,000 bees make a strong colony, it at once appears that the loss of a queen in a full, strong colony for ten or fifteen days is equivalent to the loss of a good stock of bees. That there is this loss in bees is not always true, for with loss of queen the work sometimes ceases in part, and the mortality with the old bees is less; but this lack is of course met by the diminished stores of honey. I have no hesitation in affirming that the loss of a queen in a good colony for fifteen days in the gathering season means the loss of a good colony of bees. But is this common,—this loss of a queen,—with our apiarists? I reply that with most of them it is not only common but universal.

Let us suppose that colonies are allowed to take their natural course in swarming. The bees almost invariably leave the hive before the queen cells are capped. Suppose in one day these are capped. In seven days the queen comes forth. For five days she remains a virgin, while unfavorable weather or other misfortune may prolong this for two or three days. From two to five more days must elapse before she commences her life's work, and thus we have at least fifteen days with our colony destitute of a queen. Hence I affirm that bees are left to take their natural course, in increasing, at a necessary sacrifice of one good stock of bees.

Suppose the apiarist commences the season with twenty colonies, follows natural swarming in its entirety, and values his stocks at \$8 each. His total loss will be \$160.

The remedy for this is known, of course, to every intelligent, well-informed apiarist. We have only to raise, early in the season, a good supply of extra queens, which will be kept in nuclei, and used as occasion requires. Then, when a colony swarms,—which is almost sure to be when gathering is most active, and when loss of a queen will be most felt,—a new queen will be given at once to the old colony, and there will be no cessation in its prosperity. Or, still better, new colonies will be formed artificially, and given a queen at once, in which case we can secure against too great depletion of bees, which is quite sure to result, unless much caution is exercised, if natural swarming is permitted.

By thus keeping a good supply of young, fertile, and prolific queens ever in readiness, we may not only prevent expensive delay in time of swarming or of increasing, but may supply the place of any queens which may be lost or killed in handling our bees; or we may supersede any queen which from age or other reason seems to lack in fecundity.

The rule, then, which I would state and enforce, but which is now so generally disregarded, either from ignorance or still more culpable indolence, and which no apiarist can afford to neglect, is: *Never permit a colony to be without a prolific queen.*

The second error to which I would call attention is enforced idleness of the bees, consequent upon ill-management on the part of the apiarist. This may

characterize either the queen or the workers or both, and may arise from a plurality of causes. First we will consider the

Idleness of the Queen.

The queen may be forced to idleness, either from idleness of the workers, when her instincts impel her to partial or complete indolence, or she may cease from laying simply because there are no empty cells in which she can deposit. During the past three years, and especially during the past season, I have been observing with particular reference to these two points, and can assure all of their truth. In fact, they can be so easily verified by all that I will not wait to detail the proofs.

The remedy for the first cause,—idleness of the workers,—will appear in the sequel. The remedy for the second,—no empty cells in which to deposit,—is most easily secured in that invaluable auxiliary of the apiary,—the honey extractor. I have proved this autumn, during the wonderful yields of honey from the golden-rods and other autumn flowers, that the queen may be entirely cheated out of room in which to deposit, even though there be abundance of room in the supers. In such cases the use of the extractor should *never* be dispensed with, and would be a wise proceeding even though we had to give away our extracted honey.

The second rule then which I would urge upon all apiarists is: *Never permit the hive to be without empty cells in the brood combs.*

We next come to consider the idleness of the usually busy workers, the causes which lead to it, and the remedies which may be applied.

The fact that bees are not always busy at their legitimate business is known to all apiarists. Who has not noticed the idle cluster, when bloom is everywhere, and when nectar bathes every floral envelope? Who has not been vexed in his apiary labors, during a dearth of bloom, by swarms of his little workers ever on the alert to add to their stores? And what novice has not been sorely alarmed by the robbing which he has induced by his ignorance or carelessness at such times? That this idleness is enforced is shown by all literature, and by the many current proverbs which are adorned by reference to our pets of the apiary:

“How doth the little busy bee
Improve each shining hour.”

Let us now inquire into the causes which thus compel the active workers to a course which is so contrary to their tastes.

Causes of Idleness.

1. We notice the most apparent cause,—absence of bloom, or the failure of flowers to secrete honey. In all localities there are periods, longer or shorter, when honey bloom is not. In some localities these periods are so frequent or so protracted that successful apiculture is quite impossible. I have found, too, that during wet weather, when rains were of daily or very frequent occurrence, even the best honey plants failed to secrete. Last summer our white clover season (during the entire month of June) was a complete failure on this very account.

2. If the bees have too little room, or so fill their hives as to preclude further storing, they must of course drink the bitter draught of idleness, whose evil work is shown by their dejected look, as they hang, all forlorn, in front or beneath the hive.

3. It is not infrequent that bees, especially if unshaded during the intense heat of our summers, find their hives a veritable furnace, which, despite all their efforts at ventilation, become uninhabitable. There is a profusion of bloom and the precious nectar fills every corolla tube. The bees long to convey this to their homes, but their hives being a very oven, as it were, they must perforce forego the precious opportunity, when they show their utter dejection by their abject stupor as they cluster outside their hives.

4. Bees that become hopelessly queenless,—that is, lose their queen when there are no eggs or brood to enable them to restore the loss,—often become totally demoralized. In fact, so great is their discouragement that their very nature and instincts become reversed, and instead of being the “busy bees,” they are characterized by indifference and idleness.

5, and last. Our bees may become discouraged and idle as the result of depletion. They become weak, either from overswarming or other cause, become a prey to robbers, or the bee-moth; and finally, losing all heart, fold their arms (or wings) and in hopeless idleness await their certain doom.

Remedies.

Let us now consider the brighter phase of our subject,—the remedies for these evils, which, as I shall show, are in easy reach of the apiarist, and without which he might well feel that the silver lining to the clouds that hung above his business was all too dim to keep hope alive.

Of course a wise location of the apiary will do much to remedy the first evil. If the region abounds in fruit trees, if white clover is abundant, and where it is not, if there are yet standing the grand old forests,—God’s first temples,—with their graceful maples, broad-spreading linn, and beautiful tulip trees; if added to this there are, hard by, ample marsh land abounding in solidagos (golden-rods), asters, eupatoriums (boneset), coreopsis, (tick seed), bidens (beggar-ticks), etc., etc.; then the apiarist can hardly escape an annual experience, which shall make him to rejoice in peace and plenty. If the apiarist is not thus fortunate he may yet hope to do much to insure success. He can hardly escape fruit blossoms and white clover, while alsike clover, rape, and black mustard, may be made to take the place of linn, and may all be raised, as also mignonnette with profit for other purposes, and in lieu of natural fall bloom, buckwheat and various mints may be grown; while the Rocky Mountain bee-plant would serve a valuable auxiliary, and may prove profitable to raise on account of its seeds.

The evil of damp, wet weather is one with which it is hard to cope. Yet such seasons are full of hope, as they promise rich future bloom, when the days shall be bright again. It is possible, too, that farther investigation may reveal plants which shall yield richly of honey, and yet be independent of even the most copious rains.

In the spring and during the interims of honey secretion, all through the season, the bees may be kept busy, and the queen thus active by feeding. This can be done at slight expense, as one-half pound per day to a hive is quite sufficient, and I have proved repeatedly that it pays richly for the expense and trouble.

The second evil is so easily remedied that we should hardly suppose it ever need occur; and yet I feel safe in averring that could I accurately state the amount of loss from this cause each year, I should present an array of figures that would startle you. It is not only necessary that the bees have room, but

room they will utilize. Boxes, tier upon tier, may be placed above the hive; and yet, if the bees for any cause fail to enter them, they are as effectually balked in their industry, providing there is no other space, as though there were no boxes. This is one of the most common causes of that outside clustering, which is so repellant to the instincts of the bees and so vexatious to the apiarist. The remedy, then, is to always provide in time of honey secretion abundant room for storing; and if boxes are used place them very near the brood combs, and if necessary introduce a little comb with uncapped brood in it, so that the bees may enter them. If they will not enter them, some other arrangement must be adopted, such as making use of long hives, or half or full upper stories, in which frames may be placed.

The third evil,—too great heat in the hive,—may be easily overcome. We have only to arrange so that our hives may be shaded during the heat of the day. This should never be neglected. I have often set a full cluster of bees vigorously at work simply by placing a board a foot or more above the hive, thus tempering the intense heat of the interior. Let no apiarist longer persist in the habit of leaving his bees unprotected. Let mercy as well as profit urge him, either by use of friendly tree, evergreen, grape-vine, or boards, to see that his hives are shaded from nine to four o'clock, especially as the heated days of May and June send aslant their scorching rays.

The remedy for the fourth trouble,—queenless colonies,—has already been answered while speaking of queens.

The last point to be urged is to always keep our colonies gushing full of bees. It is with bees in a colony like children in a home. You can't have too many. Then robbing is unknown, the bee-moth impotent to do harm, while the gathering of stores is so rapid as to make the apiarist rejoice with exceeding joy. To secure populous colonies, we have only to follow the advice already given, and supplement this course by preventing swarming, or at least cutting it short after our second swarms. The greatest argument in favor of artificial colonies (and is a powerful one) is, that we may thus keep all our colonies strong.

Were I asked to give the golden rule for bee-keepers, I would answer, *keep the colonies strong.*

EVENING SESSION.

This session commenced with an address by Mr. C. W. Garfield, on

TRANSPLANTING FOR THE FARM, GARDEN, AND ORCHARD,

of which the following is an abstract:

The practical man may through his experience learn how to handle certain trees in transplanting, but unless he gets at some general knowledge of plant structure and growth he has no general principles that will serve him anywhere and everywhere in this very important operation.

The seedling tree of one year when taken up is found to have a root system similar to the top,—a main trunk with very few laterals. Still, if it be washed

out with care, the whole surface of this trunk root is seen to be covered with rootlets and root hairs, which serve as feeders. If the plant be pulled up ruthlessly, the system of feeders is entirely destroyed. This may not generally be disastrous with a seedling because the proportion destroyed is not very large. But when the tree gets older, the roots that act in supplying food are all some distance from the body of the tree; and really, as trees are ordinarily taken up, the major portion of the root system is left in the ground. This is true whether the tree is of the chestnut type,—having a leading tap root,—or of the maple type,—having fibrous roots extending in every direction.

The tree which by elision has been deprived of so many of its roots that it has only power left to granulate the scars, without throwing out any feeders, starves to death, while the tree that is transplanted in full leaf continues the process of evaporation rapidly, and as the mouths are cut off, it dies of thirst.

In advising as to time of planting, the speaker said for this climate he should purchase trees in the fall, heal them in securely where the wounds would granulate, then set them in place in the spring.

He would by all means plant young trees with good fibrous roots and never invest in what are advertised by nurserymen as “extra sized trees.”

In the removal of large trees the process of root pruning one year in advance was highly recommended as a matter of safety, and if judiciously practiced there need be little danger in transplanting quite large specimens.

Transplanting is often considered a losing process, to be avoided as far as possible; but this is not true. The nurserymen and market gardeners adopt it as a method of economy in time and space.

The transplantation of garden plants was considered, and the speaker quoted from his own experience to show that in putting out garden plants it is not necessary to wait for a rainy day, but by use of water and shade the middle of a hot June day need not militate against success.

Evergreens are more often lost than any other class of transplanted stock, because their roots are so easily injured by sunlight. Success in removing evergreens is quite certain if the proper day be chosen. There is more in the day than in the month. A moist dark day is the only real suitable one in which to take up an evergreen successfully.

Mr. Garfield dwelt at some length on the preparation of soil in which to place transplanted stock of any kind. The size of the hole, he said, made very little difference if the ground was thoroughly fitted for its business.

One cannot be successful in the business of transplanting without studying the habits of plants. The same set rule will by no means work with all plants.

The question was asked, “Where would you buy orchard trees?”

Answer.—I would buy of well established nurserymen in your own State, for two reasons: *First*, to save all the transportation possible, and to secure trees grown under as nearly the same climatic conditions as possible.

What would you recommend about the removal of evergreens from the forest?

Answer.—I would prefer to get trees grown in the nursery, as they will be very much more apt to survive transplantation, and they are now to be procured for very little outlay, if small ones are purchased. But if forest evergreens are to be removed, choose small ones and shade them well the first summer and winter.

The following is the principal part of a paper read by Mr. L. C. Lincoln on

FARM GARDENING.

In commencing a garden, choose a small piece of ground near the house. It will be of but little use to describe the best kind of soil, for we have to put up with what we have handy. The soil best suited for some plants would not be the best for others. But if selection can be made, for general purposes choose a rather dark colored loam, neither sandy or clayey, as deep as can be found. Then manure and plow it, it will not do to plow it too deep at first, but work deeper gradually. It is said to be very injurious to plow it while wet in the spring. It is better to wait until the ground gets a little warm before commencing to make garden, for seed is quite liable to rot if sown while the ground is wet and damp. The ground also wants to be thoroughly dragged.

The berry bushes, pie-plant, asparagus, etc., should be in one side of the garden, as they live year after year; it being necessary to have them where they will not be in the way in plowing. You can have them in rows and work through them with a cultivator. Next to these you may have a bed for onions, lettuce, radishes, and cress. This bed needs to be raked thoroughly with a garden rake until it is fine. I think four and one-half feet is about the right width for the bed, which is level with the ground. I mark across the bed about eight or ten inches apart for the seed, which is sown rather shallow and the earth pressed upon them. I use a line in marking off my garden, and take a great deal of pride in having the rows straight and everything in order. It not only looks nicer, but saves room, and it is better about cultivating than if the rows were crooked. The rest of the garden will not need raking.

The beds for beets, parsnips, etc., may be marked in rows eighteen inches apart, if you wish to be saving of room, and don't intend to cultivate with a horse. If you wish to cultivate with a horse (which is probably the best way for farmers), the rows should be two and one-half or three feet apart, and as long as possible.

It is a great damage to sow poor seed, so if you have not got seed that you know is good, you can procure it by sending to some reliable seedsman; but you must tend to that long before you want to sow the seed. If you make your garden early, it will not do to sow all kinds of seed at the same time. Seeds that may be sown the earliest are beet, carrot, cress, celery, cabbage, cauliflower, lettuce, parsley, parsnip, onions, peas, radish, turnip, and spinach. Seeds that must not be sown until danger of frost is over, or from the middle of May until the middle of June, are beans, sweet corn, melons, squash, cucumber and tomato. In sowing seed, fine seed does not want covering as deep as coarse seed. Sow pretty thick; then thin the plants to the right distance.

If you wish to have some early lettuce, tomatoes, peppers, cabbage, etc., you can procure a few plants of a gardener, who raises them in the hot-bed or cold-frame. Some people think that it pays better to set out poor late tomato plants than it does to pay ten cents for good early ones. The late plants hardly get to bearing when the frost comes and kills them. The best head lettuce is raised from plants from the cold-frame.

You not only want good seed and good plants, but you want the best varieties. One cannot afford to spend his time with poor kinds. I would not advise farmers to buy every new variety of seed that is advertised as the best. Wait till it proves itself worthy of cultivation.

I will name a few good varieties: Bush Beans—Early Valentine and Black Wax; Beets—Egyptian Turnip and Early Blood Turnip; Cabbage—Early Jer-

sey, Wakefield, and Early Winnengstad; Corn—Early Minnesota and Stowell's Evergreen; Lettuce—Malta Drumhead and All the Year Round; Onions—Yellow Danvers; Peas—Ferry's Extra Early, McLean's Little Gem, and Yorkshire Hero; Salsify or Oyster Plant; Radish—Long Scarlet Short Top; Tomato—Trophy, Hathaway's Excelsior, and Canada Victor. There are other good varieties so well known that it is unnecessary to name them. Those who have no asparagus bed should set one out. By procuring plants two years old you can begin to use it in a year or two after it is set out. Cauliflowers are seldom raised by farmers. They are far superior to cabbage. Their culture is similar. Celery is becoming quite popular, and more of it ought to be raised. There ought to be more beets, carrots, and turnips raised to feed stock; but they can be raised in the field. I think most of us plant winter cabbage too early. They get their growth and burst open quite often.

The best way to keep weeds down is not to let them get a start. Stir the ground while they are small. Worms and insects are enough to discourage the gardener. There are some remedies, but hand picking is the sure way. Of course you all have a strawberry bed, and a few currant, gooseberry, and raspberry bushes.

I think most of you will find a good home market for fruits and vegetables.

The following address on

THE DUTIES OF THE FARMER AS A CITIZEN

was given by Mr. James Brassington:

I am well aware in this, as all great reforms, there are many difficulties to be contended against; mountains of prejudice to be levelled; dead seas of ignorance to be filled. Yet from beneath the heaps of smouldering rubbish of the dark ages; with the march of intelligence, with the large acquisition of physical knowledge that characterizes our age,—the printing, the electric telegraph, indeed, the whole inventive genius that speeds us boldly onward, there comes a voice boldly claiming to place man, the cultivator of the soil, in his political sphere. The stale and heinous vaults of conservatism are to be unlocked by the keys of duty, while the blinded eye of the husbandman that has long veiled from him the splendor and beauty of being a freeman must be cured by the patriotic love for his country's good.

Though the farmer's position in society is advanced above that of his forefathers, yet it is apparent that many have not realized the impending duty of a good citizen. There are too many drones that live upon society, receiving the profits and freedom of liberty, that give nothing in return.

The sentiment of England's bravest naval hero, "England expects every man to do his duty," won for him a battle and a name; but the sentiment has a wider significance in every free land. Transferred to our shores and our times it reads, "America expects every citizen to do his duty." To be a free and independent people, each constituent has to shoulder great responsibilities. Nor can he be able to further the blessing of liberty until he has learned to govern himself, for it is obvious that this must constitute the very basis upon which rests the foot-stool of freedom.

The good citizen is not one who shirks his part, but one who manfully works for the interests of his country. It takes energetic effort to travel against the stream; dead fish can float with it. Are the masses of us, our business men and farmers, fulfilling their part in this grand work? Let us see.

Well directed effort has its origin only in arduous study, and our success as a nation depends solely upon general education.

Is it not commendable in every good citizen to promote his nation's glory by forwarding the cause that will elevate both the moral and educational condition of his fellow citizens, and by devising feasible means for the improvement and purification of the demoralized state of our national politics and debased civil service?

It must be the duty of every honest citizen to fully prepare himself to aid in preventing the election of barroom demagogues, and township wire-pullers, whose shout of "reform" is, in their minds, the very reverse.

It is but a few years since we passed through the terrors and trials of an internal conflict, which at one time bid fair to sever the ties of our union forever. To-day the bitterness of an ill-digested election pains the heart of every sincere citizen. Business is stagnated and the wolf is raging at the poor man's door. Hundreds are being thrown out of employment, and their families are famishing. The vices and dishonesty of our politicians are widespread. Yes, indeed, they have ramified to every hamlet in the land. Every community, though situated in the fastnesses of the Sierra Nevadas, or on the far off shores of Puget sound, is rent and torn by the feuds of political factions. The desire of all sensible citizens must be to replace these wily politicians by men of integrity; men who have in their hearts the more noble cause, the welfare and happiness of their country; who are willing to sacrifice their own individual interests to those of their fellow, by promoting (as our patriot forefathers did) the blessing of liberty to each and all. But do they work for it? Do they make the long preparation and put forth the energetic action which the times demand? Though the ultimate intentions of the farmer be never so good, yet if his intellectual acquirements do not enable him to study the experiences of the world, he cannot judge correctly of the best course to be taken.

It must be no easy task to decide in such a vital question as "inflation," which, wherever tried, has resulted in extreme danger to the nation, and brought such hardship and misery upon the working classes. Nor can it be denied that the study of the relation of capital and labor gives a problem in its practical workings so complex as to demand the highest intelligence.

To-day's calm is disquieted by riots, turmoils, and the debasing influences of strikes. To-morrow, as a natural and logical result, there is no bread to fill the mouths of the perishing children.

Is it an exaggeration to assume that the tiller of the soil owes to his country at this critical moment his untiring efforts, to be faithfully and wisely rendered? Aye, the long and bloody strife of our forefathers to rid the clanking chains of British rule ever from our land, conjures us to work, and to act wisely this relation which we sustain. The tears that were shed, the prayers that were offered for the poor bleeding soldiers by our maternal ancestors, penetrate the bosom of us all.

But alas! A country so broad, so dear, and so high in the estimation of other nations, to be defiled by the influences of partisan calumny or the dishonesty of our government officials! Men who have been able to manipulate the persuasive to secure their nomination for a certain office, not because they are the most popular or the real choice of the people, but because through their base shrewdness they have been able to make promises of fat contracts, fat offices, thereby satisfying the political factions in the district.

To the husbandry falls a major part of the great and much needed work of

purifying our national politics; also to wield a powerful influence, too, in the nation's councils. To that end the farmer should invigorate his mind and conscience by studying his own wants, his country's history, and the world about him.

As the scope of his occupation isolates him in part from the advantages afforded by the large circulating libraries of the cities, or from acquiring a knowledge of the present issues, from being in contact with thinking and energetic men, he must, as the progress of the republic demands it of him, educate himself by careful, energetic effort. Is it of minor importance for the farmer to be qualified to exercise the right and duty of a good citizen, otherwise to shirk the work necessary to maintain the God-given right of independence?

Ignorance is the only slave God ever made; intelligence the only king. Labor of the brain, heart, and hand are all alike. They are God's triple alliance throughout all his universe,—the old trinity of eternal truth.

As a citizen enjoying the rights and fostered institutions, it becomes apparent to every thoughtful man and sincere lover of his country why the farmer should be thoroughly educated in this general knowledge to qualify him to be an honorable politician and to wield a helping hand in the politics of the nation.

It has long been a common freak among farmers themselves to choose a lawyer to represent them in national or State Legislature on account of his supposed superior knowledge as a legislator, or greater ability to shape the policy of the nation.

Why should those men of other occupations leave to them a field of study no more connected with their calling than any other? It would be an easy matter to name a hundred lawyers that wield more power in the affairs of the nation than does the entire agricultural population. Indeed, only two members were registered in the Directory of the 44th Congress as farmers. Shame that the leading industry of the nation, employing more than half of the legal voters of the land should not be represented, while the commercial, manufacturing, indeed all the other industries, have lavished upon them everything they ask. Many a law has been passed; many an act has been enacted to the detriment of the best interests of the agriculturist.

The result of this indifference among farmers and educated men engaged in other pursuits is that our governmental machinery is wrought by office-seekers,—men inside politics. Men of education and intelligence have seldom the time to spend for such a precarious means of promoting the general welfare and happiness of their country. They are too busy about personal gains to aid in hewing the planks of party platforms and to examine the men who are to stand upon them, while farmers themselves have not felt qualified to take the responsibility of shaping the policy of the nation.

Though the blackening influence of partisan calumny, or the vices of corrupt men marks the entrance upon a political career to be looked upon as abandonment of the paths of highest rectitude, though men of integrity and morality have not been able to escape the vile and infamous influence of the unprincipled politician, paint the picture as black as you will, yet all the more it becomes the duty of every earnest citizen to enter into the field with zeal and determination to make them better.

Farmers, we have a great work of reformation to perform, a revolution to wage, a sublime duty to fulfill, a polluted civil service to purge, and a noble relation to sustain. "Then let us be up and doing," put our shoulders to the wheel, ever doing our duty and fully maintaining our relation as worthy citizens to the

government. Who shall be the rising Cincinnatus to lead more than half of the most stable population of the country as conqueror over ignorance and carelessness among themselves and recklessness in high places, and encourage them to think that they can guide the helm of the ship of state equally as well as the plow?

In addition to those published the following papers were read at the Greenville Institute: "The Culture of Indian Corn," by Mr. S. M. Gibbs; "The Farmer's Home," by Mrs. Henry Lessiter; "Past and Present Condition and Future Needs of the Farmer," by H. S. Sharp.

At the close of the meeting the following resolution was adopted:

Resolved, That the hearty thanks of this association be tendered to the professors of the Agricultural College for their assistance at this institute, and for the interest manifested in our advancement in agricultural and horticultural knowledge.

Proof. Cook, in response, said that he was glad to think that such an interest as had been manifested would result in general good. The professors feel that at these meetings they always receive more than they give. They thanked the audience for the interest manifested that had made the institute so great a success.

The excellent fruit on exhibition was then distributed, and the institute declared adjourned.

TRAVERSE CITY INSTITUTE.

The Farmers' Institute at Traverse City was held in Campbell's Hall, commencing on the evening of January 17th. Profs. R. C. Kedzie, W. J. Beal, and Secretary R. G. Baird, from the agricultural College, took part in the proceedings. The attendance was good, though not as large as at most of the other institutes. Excellent music was furnished at both the evening sessions by the city cornet band. Mr. Fairbanks, who had been appointed President, not being present at the commencement of the exercises, Judge J. T. Ramsdell was chosen to preside, and at the request of Mr. Fairbanks continued to occupy the chair throughout the sessions of the institute.

On being called to the chair Judge Ramsdell gave an extemporaneous opening address. The object of the Farmers' Institute, he said, was to bring together the men of practice and the men of scientific knowledge, to compare views and experiences, and by means of addresses and discussions to gain a larger knowledge of agriculture, that those engaged in it might pursue it with greater success.

In the first settlement of the State farming was the principal, the almost exclusive occupation. Afterwards, under the stimulus of a protective tariff, manufacturing became more lucrative. Farmers had become discouraged, finding that so large a number of the young men were drawn off to find employment by engaging either in manufacturing or in selling the articles that were seeking a market. The Judge referred to the constitutional convention of 1850 making provision for the establishment of an Agricultural College as soon as practicable; that seven years afterwards the College was established and in

operation, and in 1861 graduated its first class. While he hoped the College would ultimately supply to every locality in the State a class of educated farmers, yet it was but a small proportion of the whole number of farmers that could avail themselves of its instructions. Hence, in order to make the College more widely beneficial to the class for whom it was especially designed, the State Board of Agriculture and the Faculty of the College had wisely hit upon the plan of holding Farmers' Institutes in different portions of the State. It was requiring a good deal of the Faculty to give their vacation to preparing lectures and attending the Institutes, but he believed the farmers would appreciate it and gladly avail themselves of the opportunity thus afforded for enlarging their knowledge with a view to improvement in their methods of agriculture.

Prof. W. J. Beal was called upon, who read the following paper on

“HORTICULTURAL EXPERIMENTS.”

It is only a few years since our fathers, and some of us, too, were busily engaged in clearing the land of timber, or in breaking up the openings and digging out the grubs. After the stumps were partially decayed and removed, and the brush well subdued, the stones were to be removed and the swamps ditched and cleared out. In connection with this work, buildings were erected, roads built and improved, stock introduced. Some attention was given to orchards and gardens. At first the new, rich soil produced bountifully of the best crops. In many places the soil has begun to show the effect of continued removal of crops, while too little has been restored or left upon the land.

Close competition, rapid progress in improved machinery and the number and value of our agricultural papers and books, our fairs, granges, and clubs, improved schools, better transportation,—these and many other things have brought with them more thought in connection with our work.

Our people are inquiring about which are the best and most profitable modes of carrying on the various operations of the farm, orchard, and garden. Lately we hear a good deal said about experiments. I believe there is no subject more profitable for us to discuss than this on the present occasion.

Much has been expected of the agricultural colleges by way of experiment.

As Mr. Joseph Harris, of Rochester, N. Y., said, the agricultural college was to tell us whether or not salt was good for manure, the best time to cut hay and the best way to feed it, whether to chop fodder or to cook it. The colleges were to tell us what is the best breed of horses, cows, sheep, and swine. They were to tell us whether it would pay to use this or that commercial manure, and which crop was most profitable; whether it was wheat, barley, oats, rye, corn, peas, beans, potatoes, grass, or roots. And no doubt I could fill many pages with questions which have been mentioned by some body as likely some day to be settled by the agricultural colleges. One man gives up in despair because the chemist cannot analyze a pan of soil from one of his fields and tell him just what and how much of any fertilizer to use to produce a given amount of any crop. Others expected us to decide whether orchards should be cultivated or left in grass, with manure or mulch, whether to set trees and other plants in spring or in the fall, whether to plow deep or to plow shallow. We were to decide the causes and remedies for pear blight and the yellows in the peach; whether to plant the tip or the base of a potato, those of large or small size; in brief, all these and hundreds of other questions were not only to be decided, but they were to be decided in a short time,—in a year, or a few years at most.

Let us consider the subject farther. Some of these questions can and probably will some time be solved, but most of them, in my opinion, never will be solved. Some of them are not of much account. The solution of these questions is not of so much importance to most of our farmers as to become accustomed to practice what they already know to be best, and to become familiar with other things which are well settled and then to put them in practice. For example, there is nothing better settled than that cultivated land should be sown to a variety of crops in succession, yet how few there are who practice no systematic rotation whatever.

Most of our farmers need to see and feel the need of better cultivation of the land, and to learn what is good culture; to give more attention to selling and buying to advantage. They need to keep accounts; to learn how to drain land properly and then practice it; to fight our insect foes thoroughly and in the most economical ways. In feeding animals they need to weigh and measure and estimate for themselves at all times to know whether they are making money or losing it. Nothing that will ever be done can relieve the farmer from thinking and experimenting for himself.

How Discoveries are Made.

Some things are discovered by accident or by trial without much forethought, but more are discovered by those who give thought to the subject. Previous notions or theories are not always safe guides as to what may prove valuable. According to our theories, a certain experiment may not seem worth testing, or it may seem too absurd to be tested.

The Difficulties in Making Accurate Experiments

are much greater than most people suppose. Some of the favorite popular experiments are the testing of different kinds of fertilizers, or different modes of sowing or planting some crop, or for comparing the yield of different varieties. The element within our control is a very small one. We do not usually control the amount of moisture, nor the amount of heat and sunshine, nor the sudden changes from one to the other. Besides this, no two seasons exactly repeat each other. We cannot find two square rods of soil which are alike or which will produce exactly alike under all circumstances. At first nothing seems easier than to treat four rows of corn across a field or garden with some fertilizer or some mode of planting and take four other rows by the side of these with which to compare them. This one experiment may seem very decisive and satisfactory. The same experiment tried in another portion of the field would show very different results. Repeat these experiments the next year and the conclusions arrived at from one experiment the first year may all be reversed. Before trying our fertilizer we ought to know whether the soil is nearly of uniform quality, or which part of the field is the best.

Let any one take two rows or four rows across a field, treated as nearly alike as can be, and weigh and measure the crops on each, and he will likely be surprised at the variation. It is more difficult to distribute fertilizers equally than many suppose, especially to distribute barnyard manure, which may not be of uniform strength and value. A difference in yield of crops may by no means be entirely attributed to the difference of fertilizers used.

Before testing a fertilizer the soil should be carefully drained and tested by at least two crops on previous years without manure, and the results carefully noted. The season may be a very dry one or a very wet one, causing great variation.

The seed must be uniform; the crops must be sowed the same day, cultivated on the same days in the same manner; they must be harvested at the same time and weighed when they are of a uniform state of dryness. One day in time of planting has been known to make a very great difference in the yield of some crops under certain circumstances, perhaps owing to rain or other sudden change of weather. The spaces of ground occupied by each must be exactly alike. The space between any plats must not escape notice. It may affect the crops differently if weeds or grass are allowed to grow. An experiment should be made as simple as possible, only attempting to decide one thing at a time.

Without stopping to give all the reasons, our English friends have decided that plats of about one-twentieth of an acre are of suitable size for testing fertilizers. Scattered among them like spots on a checker board should be some plats without the application of any fertilizer.

On account of the variable results caused by varying seasons and many other causes, to make experiments really valuable and decisive, they should be continued often for ten years or more, and repeated in different parts of the country. We must be careful about drawing incorrect conclusions, or conclusions from single experiments or from imperfect data of any kind. I have often been surprised at the hasty conclusions people have drawn from some of my experiments.

Suppose we desire to try some experiments on apple trees in different modes of culture. We may have one hundred trees of the same variety, all planted at the same time and treated about alike for some years. Yet, even on what we call a uniform soil, the trees will not make a uniform growth. Some of them will very likely die. Some will bear earlier than others, and perhaps no two will bear equal quantities of fruit of the same quality. How much of this difference to attribute to the soil, we cannot tell. How much the top is affected by the stock upon which it was grafted we do not know. Perhaps each tree has some other peculiarities aside from those mentioned. Some trees will bear fruit of better color than others. Some will produce fruit of superior flavor, even when compared with others of the same variety in the same orchard.

The health, growth, peculiarities, yield, and quality of fruit of a tree depend upon a large number of conditions intimately interwoven.

Some one may think that this is a discouraging side of the question,—that I have greatly exaggerated the difficulties of exact experimenting in agriculture or horticulture.

If he doubt it now, he will not doubt it after digging and weighing each hill of potatoes in several rows for several years, treated alike so far as he can judge. He might be equally surprised at the variation in yield of corn or wheat, or any other crop, if carefully weighed and compared on different seasons.

Experiments on feeding animals are of an equally delicate and difficult nature. Is it too much to say that many things we want to know about feeding animals and the use of fertilizers will not be settled for many years to come?

The chemist and physicist well understand the working of exact experiments in their laboratories. Some chemist has said that no experiments compare in difficulty with those the farmer may be required to make.

On account of the great difficulties and expense and time required, I doubt whether the results will yet warrant us in making many such experiments. I doubt whether the time has yet arrived for our farmers to make profitable use of the results. I think many have over-estimated the results likely to be reached in a short time.

We can discuss the questions and educate the young men. We can teach them to read, investigate, and understand.

If the farmers demand such experiments, they should at least know the difficulties beforehand and be willing to make provision for the expense, and show patience by waiting a reasonable length of time before demanding definite results.

The Qualities Needed for an Experimenter.

Professor Voeleker, a celebrated English chemist long accustomed to experimenting says, "It is essential to observe that much self-denial and conscientiousness, as well as care and attention, are primary requisites on the part of the experimenter who engages in field trials, for this simple reason—that, notwithstanding all the care that can be bestowed upon them, unforeseen circumstances may altogether spoil the result. He must be a man who does not hesitate, if necessary to throw the result of three or four years' labor into the waste-paper basket before he makes any appearance before the public."

A good experimenter, then, must be honest, patient, skillful, persevering,—a trained observer and have a good understanding of what has already been done or is already known.

For some six years I have been giving considerable thought to the subject of experiments in horticulture.

I will now run over the subject and consider some of the experiments which may seem most promising of good results.

Let me add that the farmer needs to be a student and have a thorough knowledge of botany and vegetable and animal physiology. With what interest and deep study does every successful breeder of stock watch the results of his crossing and pairing of animals. The successful raiser and originator of new varieties of plants is equally on the alert to discover anything new and valuable among his seedlings. A new seedling of any value does not escape his notice. So we have already, or will have in time, dwarf forms of every valuable plant. We may also expect to obtain varieties with cut leaves, with variegated and purple and red leaves, and varieties with a weeping habit. These may all be found as chance seedlings or sports by those who are ever watching for them.

Mutual Influence of the Stock and Scion.

This subject has demanded a good deal of attention and discussion. Some things seem to be certain, and others are merely surmised.

If we cut up a long root of a seedling apple and insert scions of different varieties, a part on each root, the young trees which result from these grafts will have roots unlike each other. The difference may be very slight or it may be very apparent. The scion, then, influences the form of growth in the root. In some cases, at least, we know that the root or stock has an influence on the scion, as in dwarfing pears when grafted on quince stock. Some pears do best on quince stock; some will not do well on quince stock, and between these there are all shades of difference. We have no certain fixed rule by which we can decide these matters without experimenting with each variety. The vigor of the stock affects the vigor of the graft. Whether the quality, color, and flavor of fruits are dependent in any degree upon the stock on which they are grafted is a matter not yet settled. Experiments are needed.

I propose trying the seeds of several varieties of apples to see if any preference can be shown in favor of any sort as to mode or rapidity of growth or hardness. I also expect to assort the seeds of each variety as to size, to see how

much better trees will grow from the best seeds. To procure results of much value will require years of time,—not less than twenty or thirty, and perhaps not even then.

I am going to get by layers a lot of trees from some thrifty bearing tree to compare with each other to see if the yield, growth, etc., vary from each other as much as those which are root grafted.

How much the productiveness of trees is influenced by the stock is not settled, yet there seems to be a difference in this particular.

Our seedlings, or stocks of apples for grafting, are nearly all obtained from apple pomace, which is mostly made of inferior or debilitated apples or those of natural fruit.

In case of pears, the seeds are imported from a milder climate. The stock may be more tender and cause the graft to be also more easily injured by a trying climate. We know seeds of radishes, grasses, clovers, and many flowers often are not so hardy nor so good the first year after importing as they are from seeds grown in our own climate. Why should not a similar rule apply to the pear seedlings? We should like to know. I am not certain that we pursue the best modes to increase our stock of apple or pear trees. We generally form rather an unfavorable opinion of a tree which was a sucker of another tree, and yet the giant pear trees which grow along the Detroit river were once little suckers. So far as I can learn, they are models of health and vigor, and fruitfulness. Perhaps there is a key to the solution of the question of pear blight lurking somewhere around the proper mode of propagating the trees.

I have tried to find out whether the Baldwin apple would not be more hardy in cold climates if top-grafted onto a hardy tree. I believe it is so affected, at least in some cases.

To decide whether the stock influenced the flavor of fruit, I should graft together a very sour variety and a sweet variety.

Mildew is a fungus caused by certain conditions favoring its development. We have lately heard that our large foreign gooseberries will not mildew when grafted on the Missouri currant. No one would guess that this would be the result without trying it. Perhaps further testing will show that the above is not well established. T. T. Lyon, President of our State Pomological Society, desires more information on the best modes of propagating fruits,—whether we should graft or bud in the root, at the crown, farther up the trunk or in the limbs, or whether we should top graft trees which have been root grafted. He also suggests experiments to decide whether the cherry, Belle de Choisey, would not be more productive on some other stock, as on morello stock.

In the case of pelargoniums a variegated scion has been known to induce variegation in the stock. A potato scion set into a tomato plant induced the latter to set small tubers in the axiles of its leaves, as we see sometimes on the tops of potatoes. The grafting of an artichoke plant into a sunflower caused the latter to set tubers under ground.

Grafting a scion of a rather weak sort, as the Iona grape, into a strong growing stock causes it to grow more vigorously. At least this is sometimes the case. All these would be interesting to try or repeat.

Testing Varieties.

This is a kind of experimenting quite easily tried, though somewhat slow and expensive, and the results very unsatisfactory. For this purpose a test orchard and test garden is needed to test new and promising varieties of apples,

pears, peaches, and other fruits; also ornamental trees and trees likely to prove valuable for timber. With these should be kept a record of their rapidity of growth, the time of bearing, yield, quality, hardiness, and other peculiarities. A test orchard and garden is not always of much value to determine the worth of a plant or tree except for a limited locality near the garden or orchard, unless the soil, climate, etc., are similar. Even then our success or failure with a variety may be owing to some peculiarity of one individual plant or the peculiar place in which it grows.

Irrigation.

Some remarkable results have been reached by irrigation, both in dry countries where no crops will grow without it, and in damper climates where less would be expected. Irrigation of gardens by windmills, by horse carts or other means, seems to me well worthy of a fair trial for a series of years. Irrigation of fruit trees in times of long severe drought I have no doubt would often prevent them from winter killing and cause them to produce more fruit. Is it practicable? Will it pay? Give us the control of water and we can grow almost any size and quantity.

Peaches in Cold Climates.

It has been suggested that we try peaches by protecting them in different modes. In winter we have buried them in light, dry soil. All died after two years of trial. We covered some with inverted barrels, using straw also. The trees died, though they may not have been managed in the best way. Some have set up boards and stakes and covered with something to keep the cold out or the heat in. There may yet be some simple mode of raising peaches at a profit in a frosty climate or in a climate subject to very cold winters.

Hedges and Screens.

It will be of value to our people some day to know what are the best hedge plants for different parts of our State, and the best way to grow them; also what are the merits and demerits of many of our trees and shrubs for screens and ornamental hedges. To some extent this is now going on at *your* College.

Thinning Fruit.

It would seem that the eminent success of a few in various parts of our country because they thin freely and systematically would make it no longer necessary to speak of this experimentally. To produce seeds is one of the most exhaustive processes to which a tree or plant can be subjected. Theoretically, if not practically, it will exhaust an apple tree or peach tree much more to produce two bushels of small apples or peaches than it will to produce two bushels of large fruit, because in the small fruit we have more seeds or pits, which are more exhaustive to the tree than the pulp or edible portion of the fruit. If needed, experiments could prove this.

Pear Blight and the Yellows.

The causes and nature and best treatment for prevention and cure of these "diseases" are still matters of discussion. Experiments are desirable. In just what direction we may look for the best results I am not prepared to say.

Insects.

The best modes of effectually destroying or warding off our insect foes may in many cases not yet have been discovered. We have advanced much within

a few years by jarring the curculio, by using chips on the ground, by the use of Paris green for the potato beetle, and bands on trees for the codling moth, and other processes. This matter of insects is one of the most promising fields for the common farmer to experiment upon. Let him try everything he can think of and watch the result, regardless of theories or preconceived notions. A few have dusted slaked lime freely among the apple trees when the fruit was the size of the end of one's thumb. The result seems to indicate the great value in keeping off the codling moths. Let us repeat it and note the result. Mr. Merriman feels confident that common plaster or gypsum will help apples to set and perfect much good fruit. He throws the plaster all over the trees when in flower, and a few times afterwards. Let us all try it. It will not cost much. No matter how absurd some of these may seem to us, let not that prevent a fair trial.

Will Potatoes or Other Plants Run Out?

Some very interesting experiments on this subject have been going on for the past eight years at the College. Some varieties have degenerated and run out entirely, although the soil was well enriched. For details see the report of the horticultural department on page 111 of this volume.

Changing Seeds.

Popular opinion in many parts of the country favors a change of seed from one farm or from one county or State to another.

To improve or infuse new vigor into varieties (or races I should more properly call them) I propose in case of corn and some other seeds to get seeds from remote parts where it has been grown for some years, and plant near each other and mix them. Since making the above notes (the idea was original with myself) I have been delighted in reading a review of Darwin's new work on Fertilization of Plants. The reviewer in the Gardener's Chronicle says: "The advantages of cross-fertilization depend on the ancestors of the parent plants having been exposed to different conditions, or from their having been intercrossed with individuals thus exposed. Thus is justified that common practice with horticulturists of obtaining seeds from different localities, and which have grown under different conditions, so that the error and evil consequences of raising plants for a long succession of generations under the same conditions may be avoided. With all species which freely intercross by the aid of insects or of the wind it would be an incomparably better plan to obtain seeds of the required variety which had been raised for some generations under as different conditions as possible, and sow them in alternate rows with seeds matured in the old garden. The two stocks would then intercross with a thorough blending of their whole organizations, and with no loss of purity to the variety, and this would yield far more favorable results than a mere exchange of seeds.' The good results of such crossing will last for several years, though most apparent the first year.

The changing of seed from one kind of soil to another sometimes seems to be of great advantage, but just the rules or laws which govern this change have not been discovered. To some extent it is practicable for every farmer to receive benefit from this at once. Buy seeds of peas, beans, corn, etc., in each case of the same variety, but buy them from different sources, and mix them for sowing for seed.

The yield of seeds by crossing in different ways is shown in the following tables, which will well repay careful study.

	Plants from a cross with a fresh stock.	Intercrossed plants of the same stock.	Self-fertilized plants.
<i>Mimulus luteus</i> .—The intercrossed plants are derived from a cross between two plants of the 8th self-fertilized generation. The self-fertilized plants belong to the 9th generation.....	100	4	3
<i>Eschscholtzia Californica</i> .—The intercrossed and self-fertilized plants belong to the 2d generation.....	100	45	40
<i>Dianthus caryophyllus</i> .—The intercrossed plants are derived from self-fertilized of the 3d generation, crossed by intercrossed plants of the 3d generation. The self-fertilized plants belong to the 4th generation.....	100	45	33
<i>Petunia violacea</i> .—The intercrossed and self-fertilized plants belong to the 5th generation.....	100	54	46

In William's Choice Stove and Greenhouse Plants, Vol. I., p. 32, we find the record of some similar experiments made some years ago on several ornamental flowering plants.

Experiment 1.—Produce of a flower not receiving artificial aid in any way.	Experiment 2.—Produce of a flower fertilized with its own pollen.	Experiment 3.—Produce of a flower fertilized with pollen from a separate flower grown upon the same plant.	Experiment 4.—Produce of a flower fertilized with pollen from a different plant of the same species.
25 seeds.	60 seeds.	100 seeds.	300 seeds.

Very likely, judging from the first table, the further crossing of different stock of the same variety would have made a still greater improvement in the yield of seed.

Changing Stock.

In many instances plants have been improved by repeated selection of the best and continued cultivation for some years on one farm.

It is a popular notion in many places that plants may be improved by a change of seed or stock from one country to another. Many of our familiar weeds are more thrifty with us than they are in their native country.

We believe in our severe climate the Ayrshire cattle excel the Jerseys in hardiness, because the former for many generations have been bred in Scotland, while the latter for a long time raised on the channel islands, where they have not been subjected to great extremes of climate. In some cases the same rule holds good for plants; in other cases it does not. The test must be made for each variety or species, as no definite rule can be given as a guide in all cases. Seeds taken from the same fruit and sown in soil of uniform quality and treated in every way as nearly alike as possible will not always grow or produce alike. If some seeds are removed to soils and climates very unlike and treated unlike in culture, the plants will be much more likely to change their character. Continue this different mode of treatment for some years and a change, great or small, is most sure to be the result.

Manure and Culture or no Culture for Orchards.

This seems to be a question not yet solved and one well worthy the careful attention of our best men.

Some experiments now in progress were begun at your College five years ago next spring. They were intended to decide whether it was better to cultivate large trees or leave them in grass where no fertilizer was used or no grass taken off; also to discover whether it was of much account to cultivate small circles about trees; also whether a small circle of grass about a tree affected it for good or bad, or whether it was of little importance; also whether we could discover any difference in the effect on the trees or fruit if we applied manure close about the tree or in a large circle, or spread it broad-cast over the ground. Experiments are also going on in which a heavy mulch is kept on the ground; also experiments in the use of unleached ashes. Time will not permit a full account of these experiments at this time. Although not yet completed and but few results published, yet they have attracted a good deal of attention from J. J. Thomas and others. For a full account see page 119 of my report in this volume.

Improving Wheat and Other Grains.

This seems well worthy of trial everywhere by every man who raises wheat. Although this is not a horticultural experiment, I will venture a few remarks upon this interesting and important subject. We should not only give good culture on ground well adapted to wheat or well prepared for wheat, but we should take more care in the selection of good seed.

Touching on this subject, I quote from an article by George Geddes in the Michigan Report of the Board of Agriculture, p. 182, 1869: "At or before the time of threshing, set some sheaves on a floor, heads upward, and then draw out the most perfect heads,—those of the greatest length and the best filled. Put this selected seed on land in the best condition in every respect, weed the wheat the next spring. Out of this again the next year draw the best heads, and so on for several years,—the longer the better,—by and bye he will have some seed wheat to sell that he may be willing to have bear his name, and he will be a public benefactor." By this means we will get seed wheat which has had good ancestors for a series of years. Every breeder of stock knows the importance of a long line of good ancestors. A native cow may be a good milker, but her calves may make good milkers or poor. The calves may take after some of their poor relations not very far back. If well-bred for milk, the calves are much surer to be good milkers. The same principles apply with equal force in regard to plants and seeds. I will enforce this idea by referring to some experiments made by Frederic F. Hallett, in England, as reported in the Journal of the Royal Agricultural Society, 1861, page 371. He began by selecting the best head of wheat he could find, paying especial attention to the quality.

"TABLE showing the importance of each additional generation of selection.

LENGTH.	Grains.	No. of ears on finest stool.
1857, original-ear $4\frac{3}{8}$ inches.....	47	-----
1858, finest ear $6\frac{1}{4}$ inches.....	49	10
1859, finest ear $7\frac{1}{4}$ inches.....	91	22
1860, ears imperfect from wet season.....	-----	39
1861, finest ear $8\frac{3}{4}$ inches.....	123	52

Thus, by means of repeated selection alone in this short time the length of the ears has been doubled, their *contents* nearly trebled, and the 'tillering' power of the seed increased five fold." The seeds were planted, one in a place, nine by nine inches. The plants were cultivated. This may seem to look well on paper, and to be only worthy of a fancy farmer. Of course we should expect that ordinary care would soon cause the wheat again to degenerate. From seed raised in this way a whole field of ten acres in a very unfavorable year yielded fifty-seven bushels to the acre, while with ordinary seeds on previous years the same land yielded from thirty-two to forty bushels to the acre. He could not find that there was any particular part of a head of wheat which produced seed that would uniformly yield better than seeds from any other part of the head. As we might expect, after continuing the experiments Mr. Hallett found that the heads became more uniformly of good size and good quality and good yield. Like a well bred flock of sheep, where the owner had bred toward one standard, they were even and uniformly good. Many of our farmers are quite particular to sow good plump seed wheat, and nearly all, perhaps all, would prefer such seed. But how are the plump kernels selected? By means of the screens in the fanning-mill the plump kernels are separated. They come from all sorts of heads long or short, large or small, from those stools producing a few small heads, or from those producing many large heads. They are selected at random from anything that may happen to produce plump kernels. There is, in this common practice, no attention paid to the pedigree. This plan is good so far as it goes, but it does not go far enough. It does not go half way. Are not the above suggestions worth the attention of our best farmers? It seems to me practicable to improve the yield and quality of our wheat.

I will refer again to the experiments on corn.

Improving our Native or Wild Fruits.

The process for improving our wild fruits would be similar to those used for improving our cultivated varieties, by selecting the best and by cross-fertilizing the flowers.

We cannot tell what native fruit would first sport into something new and desirable. Some of them are doubtless just ready and waiting to give a bountiful reward to the skillful hand of the experimenter.

To improve a wild plant we take it from its native place and cultivate it, treating it artificially or very different from nature's treatment. By some means which we do not understand and over which we have no control, the plant "sports," or suddenly changes in some way, perhaps in some respect agreeable to us, but as often otherwise. We select this sport, which suits us better than the original form, and plant it apart from all others of the species. We save its seeds, and very likely get others like the first. By selecting seeds from a certain type for a time varying with each plant, we get the new variety established in such a way that it will come true to seed. We get what is called a permanent variety or a race. We have examples of varieties in our apples, pears, potatoes, geraniums, and cultivated roses. They do not come true to seed. We propagate them by cuttings, layers, budding, or grafting; while races can be propagated by seeds, as our races of Indian corn, wheat, oats, turnips, squashes, radishes, cabbages, and the like.

By selection, gardeners have now got Phlox Drummondii and Clarkia and other flowers so they will come true,—so they have become races. I doubt not, with time enough, the Northern spy apple could be made to come true to seed.

It might take ten generations; it might take fifty or more. The early Barnard peach and others are already partially on the road from varieties to races.

On our most promising wild fruits Dr. Gray has a fine article in the Transactions of the American Pomological Society for 1873. Some of these already improved are strawberries, raspberries, blackberries. Some others which might seem worthy of experiment are the persimmon, paw paw, wild crab-apple, wild plum, ground nut, gooseberries, bush cranberries, haws, cranberries, huckleberries, butternuts, black walnuts, hickory nuts.

Improving our best Fruits.

May not our quinces be much improved in hardiness and in quality? Also may we not expect much in addition to what has been done in the hardiness, yield, and keeping qualities of most of the fruits now cultivated? I shall refer to this subject again.

We hear now a good deal about improved buildings in which to keep fruit well.

Fresh apples in abundance for May and June and July will be a luxury well worth trying for, especially if they can be afforded at reasonable prices.

Our modes of preserving fruit in cans and by improved methods of drying seem nearly perfection, but there is still need of more fresh fruits in all seasons, especially of grapes.

Degenerating Varieties.

Perhaps we are doing enough of this already, certainly we are as far as profit is concerned, for we still find scrub cattle and runty pigs, and poor grain and vegetables. I have shown how rapidly wheat may be improved.

It seems to me of some interest for scientific purposes to sow the poorest wheat or seeds of any other cultivated plant, and give them hard fare for a number of years, and so have them for a contrast.

Two Plants Required to Produce Good Seeds.

How far this is the rule I am unable to say, not having given much attention to the subject. In case of chestnut trees, in 1875 one tree blossomed on our grounds freely, but no fruit was produced; in 1876 two blossomed near each other, and some fruit was perfected. In Coldwater, Michigan, on the place of Mr. Schovill, a thrifty chestnut tree has stood alone and flowered freely for some years, never producing fruit. At Galesburg, this State, Mr. H. Dale Adams informs me, there is a large, lone chestnut blossoming annually, but never yielding fruit. Both sorts of flowers are raised on chestnut trees in perfection. The same has proven true with single plants of Indian corn in some cases. The above examples are probably not new to many of you. How far this rule applies to our cultivated plants I am not able to tell, but certainly the chestnut is not a lone exception, and perhaps the *chestnut* is not an exception in all cases. Here is a fruitful field for valuable experimenting.

Crossing and Hybridizing Plants.

I have now come to one of the most interesting and scientific portions of my lecture. To understand and to be able to experiment on this subject, it is necessary for a person to have some knowledge of botany. I have no right, however, to presume that a large portion of my hearers possess this knowledge. I will briefly explain a few of the most essential points in the simplest possible manner.

If we examine the flower of a peach or cherry, we shall find a lot of slender objects, the stamens, with little bunches or sacks on the extremity (anthers). These surround a single green object which occupies the center of the flower. This green object is the pistil, and is destined to become the peach or cherry, if nothing happens to prevent.

The little anthers contain an abundance of fine yellow dust or powder, the use of which is to fertilize the pistil or young rudimentary peach or cherry. Unless the pistil is so fertilized no fruit will set. In some seasons trees blossom full, but no fruit is produced. This may be owing to a severe storm which prevents the pollen from getting onto the pistil, or more frequently, I think, a failure to set fruit is owing to the small quantity and poor quality of the pollen or fertilizing dust. In such seasons I have found that fruit will set if we select some good anthers and carry the pollen and apply it to the proper place. Young trees often blossom for several years before fruit is produced. This is often, if not always, owing to the poor quality of the anthers. Very often insects or the wind help to scatter the pollen. One way to improve cherries or peaches is to carry the pollen from one variety to the pistil of another, thus selecting the two parents of the future seed.

In thus crossing the plants we may not get what we want any more than the breeder of animals always realizes his ideal. To be sure of affecting the cross as we want, we must visit our cherry flower before it is quite open and cut out all the stamens and tie up the rest of the flower in a muslin or paper sack. At this time, or on the next day or perhaps two days after, take off the sack and apply a plump ripe anther to the tip of the pistil, dusting it all over freely. If the pollen is applied before the pistil is ready it will be in the proper place as soon as the pistil is ready. Mark by string or label the flower operated upon to get its seeds for sowing. The pollen will keep for some weeks, if the two flowers do not happen to be open at the same time. I usually transfer the anther by clasping the slender stem in forceps. Some use a camel's hair brush, but I do not like it for some reasons. If you experiment on apple blossoms, try those which are likely to open first. These are situated in the center of each cluster of five to seven or eight flowers. The center flowers are the strongest and most likely to set fruit. To concentrate the strength of the tree on a few flowers, cut off a large number of them in the vicinity of the experiments. In the case of grapes, it will be necessary to carefully remove the outer portion of the flower and the stamens some days before these would naturally fall off.

To cross wheat much care will be required to open the young flowers without injuring them. The plants spoken of, and most others, have the stamens and pistils in each flower, but some, as the Indian corn, have the stamens on one part of the plant and the pistils on another. I presume every one knows that the dust on the top of the corn stalk fertilizes the silk, a single thread of which runs down to each rudimentary kernel. If we want to cross corn we can plant our two kinds together, and just before flowering cut the tassels from the stalks upon which we are experimenting. Quite a number of our forest trees and shrubs have the stamens in one place and the pistils in another, as all our oaks, chestnuts, beeches, hickories, and walnuts. Our willows and poplars have nothing but staminate flowers on some of the trees and pistillate flowers on other trees. Our melons, squashes, and cucumbers have two kinds of flowers on the vines. The insects, bees, and striped beetles carry the pollen for us, or else we should have no squashes or cucumbers.

The Importance of Good Breeding

is no longer a question of doubt. I can remember when much was said to the contrary. The pig, for example, was called the animal, and the corn was called the breed, implying that the feed was everything, the selection of the animal was of no consequence. Every thinking man now knows that there is much more profit in feeding certain kinds of quiet hogs than there is in feeding a restless, long-legged pointer. There is no question but that the grade short-horns are more profitable than scrub cattle on the prairies of Illinois. Much skill is required to breed animals successfully to produce the best results.

From all that I can learn of others, and from my own experiments, I am fully convinced there is as much chance to use skill in cross-breeding plants. This crossing of plants by human agency is yet in its infancy, but I anticipate in the future great improvements in this direction in our wheat, oats, corn, garden vegetables, in our orchard and garden fruits and in our ornamental plants.

In breeding animals much attention is given to the care and feeding, so in plants care should be given to soil and cultivation and the improvement by selecting good perfect seeds.

Within certain limits, a person can breed and select or create almost any kind of fruit, flower or grain he may choose. The pear has been improved from a tough, leathery, worthless fruit. Cabbages and cauliflowers have sprung from a wild, worthless weed growing on the coasts of Great Britain. Large roots have been developed on beets and turnips, varying in size, shape, color, and mode of growth. See what England has done for the Rhododendron and for geraniums; France for roses, and Belgium and Holland for tulips and hyacinths.

Careful selection of seed, as practiced by many of our best farmers, is well worthy of all the attention it receives, and good culture also, but I hope soon to show you that these precautions are by no means all that can be done to improve varieties. This slow process of selection can be much hastened and made more certain and definite by cross-breeding. Every man should engage more or less in this improvement of his grains, and vegetables, and flowers. Children should learn, thus an additional charm would be given to rural pursuits.

Every now and then are found new chance seedlings which are valuable. These may be, and no doubt are, often due to crossing of two varieties by means of insects.

Here are some ears of pop corn which grew in the vicinity of some sweet corn. A few grains of pollen here and there changed the color, size and texture of some of these kernels. The male element has produced a remarkable effect the first year. With all kinds of plants the effect is not so apparent on the first year, but the quality of the pollen in all cases should be looked after to secure the improvement of varieties.

What do we think of a man who selects the best calves, pigs, and lambs from the best mothers, paying no attention whatever to the selection of a good male parent. This is what our very best farmers are now doing all the time with their seeds and plants. They select from a field the largest and fairest ears of corn and the plumpest wheat.

In our corn fields are often large numbers of slender stalks, bearing no ears, or very small ears. These stalks have tassels, and they scatter pollen and are very apt to scatter some on the ears of the best stalks,—on the very ears

which we shall select for seed. The different kernels on the same ear may have twenty or more different male parents. Now theory and analogy at least tell us, if we wish to improve our corn to the greatest extent, we must pay some attention to the pollen used. A much better way would be to plant a piece of corn by itself on good soil and treat it well, giving the stalks plenty of room. Before shedding pollen, cut out entirely or remove the tassels of all the poorest stalks. In this way, we not only select seed from good females, but also from those fertilized by good males. Wheat, oats, rye, barley appear to be self-fertilized before the flowers open. I have already referred to their improvement.

Who are Breeding Plants.

With grapes, E. S. Rogers, of Massachusetts, has produced some remarkable hybrids; also S. W. Underhill, of Croton Point, and Campbell, of Ohio, and Moore and Ricketts, of New York. Charles Arnold, of Canada, has experimented on grains and fruits. President Wilder has improved a variety of plants. Pringle, Knox, Brownell, Breese, Hexamer, B. Hathaway, Saunders, of Canada, and some others are engaged in this good work. The speaker is doing something in this subject. A. J. Armstrong, of Schoolcraft, Michigan, has done something in this way with wheat. He had a very interesting collection at our last State Fair. One head contained some 180 or 200 kernels, and was ten inches in length. The quality was not first rate. There may be six men crossing wheat. Something has been done at your college, mostly, however, by way of teaching the subject to the students. Pressure of other duties have absolutely prevented enough attention to this important subject.

In Europe there has been much done on peas by Laxton, Dr. McLean, and others.

Every Experiment not a Success.

In England, one man after repeated trials hybridized wheat and rye, but could make none of the seeds grow. He lost the stock. Efforts have been made, without success, to cross wheat and oats, and barley.

Professor Sargent succeeded in crossing the radish with the cabbage.

Wm. Saunders, of London, Canada, has given the results of his experiments.

In 1869 he crossed fifty flowers of the pear; all failed. The next year he crossed forty-five pears. One pear was produced which contained three seeds. These did not grow. In 1871 he crossed ninety-five pear flowers. Eight pears were produced, and they contained forty-four seeds, which only produced six plants. In 1868 he operated on three hundred flowers of grapes, and 116 berries produced 106 plants. In 1872 only one of these grapes survived, and that was weakly.

He gives whole pages of examples where he crossed different kinds of fruits and most of them failed.

Three years ago I got quite a number of seeds from apples which were cross fertilized. After waiting a year, they were carefully planted in the greenhouse to give them an extra start, and the mice ate every seed. Away went twenty-dollars worth of labor,—some two years of time,—and all my prospects of new apples from that lot of seeds. One year some boys, possibly students, took the fruit, although it was marked by tying it up in bags of netting. I could give many instances of the nature of the above if it were of any use. Of many flowers crossed, often but few fruit. These often produce but few seeds; often but few of these grow; often many of them are tender and winter kill; often nearly

or quite all the rest are worthless. This is the dark side of the picture. In getting seeds of apples, I have generally had good luck, if we may call it luck.

Which Parent Exerts Most Influence?

Mr. Armstrong thinks the pollen exerts a greater influence than the pistil in case of wheat. Prof. Secoy, a French writer, says: "In general the product resembles both, but in many cases the hybrids resemble the mother more than their father."

Pringle says, in the case of potatoes, sometimes the father was exactly reproduced and sometimes the mother. Berkeley says, "It is not very easy to determine whether a hybrid is more like the mother or father."

Isaac Anderson Henry, a celebrated Scotch experimenter, "has had many instances of hybrids taking sometimes to one side and sometimes to another, but most frequently to that of the mother."

Darwin says, "When two species are crossed one has sometimes a prepotent power of impressing its likeness on the hybrid."

It is quite a popular notion in England that the pollen or male has much the most influence on the offspring.

J. W. Pearson, England, had raised from 3,000 to 6,000 geraniums per year for six or seven years, and tried to discover the influence exerted by each parent. He concludes that "some take after the male, some after the female; some after both, and some after neither; and that some kinds are good breeders and some are bad ones."

Similar efforts have been made in case of different kinds of domestic animals. The subject is yet unsettled and perhaps always will be. Most experimenters agree, however, with Dr. Denny, of England, that "by careful and persistent fertilization, under the guidance of the observation of results, it is possible to produce almost any modification in the character and habit of our plants in color and form of flowers we may desire."

After crossing two varieties or species of annuals, the seeds resulting will sport or vary, giving many forms as they are sown for two or four or more years. Some of the new plants will run back or revert to parents until fixed by repeatedly selecting a certain uniform style. Thus from one single seed, as the result of a cross, we may in a little time get many different races unlike each other.

Other Points to be Observed or Tested.

Mr. Arnold believes that in making crosses the natural stock in apples and pears which have been grafted may exert a bad influence.

Crossing plants seems in most cases to add renewed vigor to the stock, which in some cases seems to become debilitated by long in-and-in or close breeding.

The experimenter may have a very high ideal of what is a good fruit or grain. He can easily imagine something better than we now have. Every variety has its faults. No rose combines all the good qualities of roses in color, size, hardiness, and abundance of flowers.

To combine the good qualities of any two plants we may cross, as in currants, a berry with excellent flavor with a large one which may be deficient in flavor. The same with other plants. To improve a good keeping fruit, we may cross with one which is not so good a keeper, but better in quality.

Take care to select vigorous plants in all cases. To induce variation stimulate with high culture.

In crossing apples, for example, we may wish to determine whether the pollen

the first year affects the quality of the fruit. Some experiments made at the College indicate that this influence may be apparent on the first year, as in case of a cross between a Red Astrachan and Talman Sweet.

To decide whether any influence is exerted in time of maturing, cross an early variety with a late variety.

Mr. Ricketts, of Newburgh, N. Y., who has had great experience in hybridizing the grape, asserts very confidently that "the period of ripening of a hybridized bunch of grapes is affected by the influence of the pollen of the male parent;" that he has verified it by the experience and observation of years. G. M. Campbell, of Ohio, also accords with this view.

Crossing of Apples and Crossing of Pears.

On account of the long time required for obtaining the results, few men have experimented on these fruits, for this reason this field seems to offer great inducement to experimenters. But very few men are doing anything on these fruits. Much has been done with grapes, strawberries, potatoes, corn, and peas.

Getting new varieties of potatoes is a much easier matter than most people suppose. Treat them in the spring as you would tomato plants. In raising about six hundred new seedlings this past season, one of them yielded in the first year eight pounds of good potatoes, and many single plants gave what would be called a good yield for potatoes planted in the ordinary way. Every man ought to try, at least once, and raise some new varieties of potatoes. For a fuller account see page 117 of this report.

Selection and good treatment give good results, but they are less permanent than crosses. Select the best hybrids, judiciously cross and select and combine for the best results, giving uniformly good culture. There is ample scope for great skill and profound judgment in making these combinations. The man who engages in it is quite sure of a reward, besides he is a true benefactor.

Mr. Henry, quoted previously, says, "As to fruits, I entertain the belief that we are on the eve of a revolution," and I may add that in grains the field seems even more promising; and yet the millenium will probably never come, at least for fruits and grains. We may approach nearer to it, but the future will likely bring greater deterioration of the soil, more diseases of plants, and a greater number of weeds and troublesome insects. Even in the Genesee valley, fruits of excellent quality are not raised in quantity sufficient to supply a demand.

DISCUSSION.

Prof. Tracy, of Old Mission, said, "I planted a seed of variegated corn at quite a distance from any other corn. It raised a stalk with a variegated leaf, but produced no ear or any grain except a few imperfect kernels on the tassel."

Mr. Clyde.—I have experimented for about thirty years in regard to raising a single stalk of corn where it could not be impregnated with the pollen from other corn, and it never perfected grain in any such case.

Judge Ramsdell.—Mr. Hannaford sprinkled half of his orchard with slacked lime. The codling moth did not appear where the lime was used, but were in abundance where it was not used. Do you regard it as certain that the lime destroyed the moth?

Prof. Beal.—I should regard it as uncertain. The moths may have been destroyed, or they may simply have been driven to choose the trees on which the lime was not used.

Mr. Hammond.—Would you sprinkle the lime upon the leaves when they are wet or when dry?

Prof. Beal.—When wet, so that the lime may adhere to the leaves and young fruit.

Prof. Tracy.—While I agree with Prof. Beal that there are many difficulties to be overcome in making experiments, and that in many cases valuable results can be obtained only by following up an experiment for a number of years, yet I know from experience that by cultivating the habit of observing valuable results can be reached even in a short time. I once undertook some experiments in regard to the effect of different kinds of food in producing milk. I weighed each milking. The cows were drinking a supply of surface water. After a time this well froze up so that I had to water the cows from a cistern under my barn. The cistern water was much warmer than that from which the cows had previously drank. From using the warmer water the flow of milk was increased, each cow giving from one to three pounds more than when using the colder water. I should not have made the discovery but for the fact that I happened to be weighing each milking at the time.

A single experiment cannot be regarded as conclusive, but if a number of individuals would coöperate by experimenting in the same line under a variety of circumstances, errors would be eliminated and valuable results reached. For instance, if fifty men in a neighborhood should undertake to test the value of plaster, each on a few rows of corn, by a comparison of the results, we would know pretty well what to expect from the use of plaster.

FORENOON SESSION.

Prof. R. C. Kedzie gave the following address on

“ILLUMINATING OIL.”

MR. CHAIRMAN:—I desire to say a few words on the subject of kerosene in regard to its illuminating qualities, and especially on the influence of its adulteration as influencing its burning quality. From all parts of the State I hear complaints that the oil will not burn satisfactorily, and gives very poor light; and there is a very general feeling that this wretched quality of oil is owing to the high test required by our law. The oil dealers zealously foster this idea and try to make our people believe that the way and the only way to remove the evils complained of is to reduce the test and permit the people to use a lower grade of oil. Petitions are pouring into the Legislature asking a reduction of the flash test to 120° Fahrenheit. Perhaps the people here are petitioning for this change.

Before deciding to make such a change we ought to consider very carefully the following questions: Will the change remove the evils complained of? Is it the only or the best way to remove these evils? Will the people be equally safe with this lower grade of oil? The question of safety I have put last, but it is really first in importance. Before our present law in regard to inspection of illuminating oils was enacted and enforced, “kerosene accidents” were of almost daily occurrence in our State. You could hardly pick up a newspaper

that did not contain an account of some "kerosene horror." People began to look upon it as a dangerous substance, and "accidents" as the natural result of its use. But since this law has been enforced, all this has been changed; very few accidents have occurred, and so far as I can learn but one life has been lost in our State by the use of kerosene within the last two years. This question of public safety both to life and property is too important a matter to be lightly dismissed in considering this subject.

I now turn to the question whether the poor burning quality of the oil is necessarily connected with the high test. Before discussing this point let me describe how coal oil is made from petroleum. Last month I visited Cleveland and spent several days in examining the methods of refining. The petroleum is brought in immense iron tanks from the oil regions of Pennsylvania, from Titusville and Oil City, and lately large quantities are brought from Butler county; this petroleum differs from that brought from the older oil regions, in having a larger proportion of paraffin. The crude petroleum is distilled in very large stills made of boiler iron, which contain from 85 to 1,000 barrels of petroleum. Many of these look like immense steam boilers. When the still is filled with petroleum the still is heated just like a steam boiler and the volatile products escape just as steam does from a boiler, but the vapor is carried through long iron pipes which are placed in boxes of cold water in order that the products of distillation may be condensed and saved. These boxes of cold water are usually about four feet square, and from 200 to 250 feet long. In the bottom of these "condensers" are placed a number of iron pipes which run the whole length of the condenser, and into these iron pipes the vapor formed by distilling the petroleum is conducted and is thus condensed by contact with the cold iron pipes. The first vapors that are produced in distilling the petroleum are not condensed but escape at the further end of the iron pipe, and are called gas by the workmen. Then a very volatile and inflammable material is condensed called naphtha; then a heavier and less inflammable oil, kerosene; and finally a heavy oil containing a large amount of paraffin, called paraffin oil, and finally a quantity of tarry matter is left in the still.

The three products of distillation preserved at Cleveland are therefore naphtha, kerosene, and paraffin oil. Thus the products of distillation pass from a very light and volatile material which is too volatile and inflammable to be safely used in our lamps, to an oil too heavy and unflammable to be satisfactorily used in ordinary lamps. Between the volatile naphtha and the heavy paraffin oil comes,—*or should come*,—the kerosene for lamp use. But kerosene differs greatly in quality; the first that is saved in distillation or refining differs but little from the last portion which was cut off as naphtha: it is a little heavier and a little less volatile than the "heavy naphtha." As the refining proceeds the kerosene becomes heavier and less volatile, and its flash test rises. The first portions of kerosene saved in refining is known as 110° oil, the latter portions are our 140° oil. When the refining has gone a little further paraffin oil begins to come over. This paraffin oil holds in solution a quantity of a solid waxy material, paraffin. This paraffin makes an excellent quality of candles, but it is wretched stuff to burn in a lamp because it lowers the capillary power of the oil to such a degree that it will not freely rise in the wick; when half the oil in the lamp is burned out the lamp goes out, the wick gums and chars, and a very poor light is the result. I have examined the influence of paraffin on the capillary power of the oil and I find that a small quantity of paraffin will diminish the capillarity of oil to one-seventh of its original capillary power. If the refiner

suffers any large amount of this paraffin oil to run into the kerosene of course we shall have an oil of very poor burning quality. All the poor-burning kerosene I have examined contains large quantities of this paraffin oil. In our part of the State we often find kerosene that in very cold weather becomes solid like lard, and of course it will not burn satisfactorily.

A voice, "It is just so up here; we have to get our barrels of kerosene in by the stove to thaw it out before we can empty it into the oil tank."

Well, *that is not kerosene*; it may contain kerosene, but it is properly paraffin oil. The refiner is tempted to run into the kerosene as much paraffin oil as he can, because paraffin oil is very cheap and kerosene dear. Paraffin oil is only worth 10 cents a gallon and high grade kerosene is worth about 30 cents; thus for every gallon of paraffin oil used to adulterate the kerosene the refiner makes a profit of 20 cents a gallon. With such a temptation before the refiner it is no wonder that our kerosene is adulterated, and its burning quality so poor.

When the oil is free from paraffin we find no complaint of its poor burning quality, and no matter what is the flash test employed, if any oil is largely adulterated with paraffin it will be of poor burning quality. You thus see that lowering the flash test will not necessarily give us a good oil, and if paraffin is excluded we shall have a good oil even if the test is high.

A voice, "How will you exclude the paraffin?"

The test for an injurious amount of paraffin is very simple. Cool the oil for ten minutes down to 20° Fahrenheit by a mixture of ice and salt; if it remains perfectly clear and transparent it does not contain enough paraffin to injure its burning quality; if it becomes milky and clouded or even solid, reject it at once.

I now return to the question whether an oil of lower flash test will be equally as safe as the 140° oil. Many persons who have used the lower test oil and have not been burned up or blown up by its use, conclude that it is safe for all persons. But there are persons in almost every community who are careless in their habits and prone to accidents. "The poor ye have always with you," and the unlucky are not wanting in most communities. Careless people will use dangerous things heedlessly. Lamps will break in an unforeseen way, and accidents are perpetually occurring. The public safety requires something which shall be safe even with careless usage. Your neighbor's carelessly fired house or barn may burn up your buildings.

I have made many experiments with lamps filled with kerosene of different flash test, by allowing the lamp to burn for a time and then breaking the lamp without extinguishing the flame. When 140° oil was used, the flame was soon extinguished, or else the fire spread so slowly that there was ample time to secure the means of extinguishing the fire. When oil of a much lower grade was used, the flame often spread with uncontrollable energy, and if this accident had occurred in an ordinary dwelling, the building would be very apt to burn up. From such experiments, I conclude that we are much safer in using 140° oil than oil of a lower flash test. When we get a test which shall exclude all adulteration by paraffin, I think we shall hear no more complaints about the poor burning quality of the oil. We shall thus secure good light and public safety.

Many persons complain because the high test kerosene costs more than low test oil. You must all understand that the enormous advance in coal oil during the past year has nothing to do with the question of high test or low test. It is the result of a combination or ring formed by the principal oil refiners in this

country, and whenever the ring is broken, the price of oil will come down. But it is unquestionably true that high test kerosene costs more by the gallon than low test. The best quality of high test oil now costs at wholesale 35 cents a gallon, while the so-called 110° oil costs only 28 cents, a difference of about one-fourth in cost. But the high test oil will burn one-fourth longer, so that it is really as cheap as the low test oil. You pay more for a gallon, but get more light out of the gallon, and what you aim to buy is the light. You would not feel that you had made any gain if you could buy molasses of one grocer for 25 per cent. less than was charged by another grocer if you found that the first grocer had added one-fourth part of water to your molasses. What you want to buy in the molasses is its sweetening power; so in your oil you want to buy its power to afford light.

I hope our present Legislature will make amendments to our law so as to reject all oils heavily adulterated with paraffine oil, and then I think the people will make no more complaint about poor oil, while the public safety shall not be imperiled by a reduction of the test, which will not remove the evils of which the people so justly complain.

DISCUSSION.

Mr. Clyde.—Is there more danger of the lamp exploding when nearly empty?

Prof. Kedzie.—Yes; the space in the lamp from which the oil has receded is filled with gas and the heat of the lamp increased, hence a greater liability to explosion.

The following paper by H. W. Curtis, Esq., was read by Mr. Thomas Bates, entitled

HELPS TO IMPROVEMENT.

Agriculture, manufacture, and commerce are the three grand divisions of human enterprise. I do not place one above the other, either in dignity or importance. It requires but a moment's thought to see that without either the world would speedily lapse into barbarism. I do not, therefore, sympathize with the present fancy of some of my brethren that there is nothing of dignity or honor worth speaking of outside of agriculture.

According to my theory each is alike honorable; and true wisdom demands that the most cordial harmony prevail between them. I owe the man who places an improved harrow in my hands a debt of gratitude, as well as fair pecuniary compensation. If I pay him with better fruit, hay, or turnips than are common, he owes me a debt of gratitude for the pains I have taken to help him to a better living. How unbecoming is bickering or jealousy here. How much more will two honorable men, so coming face to face, each be inspired with gratitude towards the other.

My merchant is an open, "fair and square" dealer,—no catch-penny trickster. I am grateful to him for a bill of honest goods. In return I give him a good sample of wheat. He is equally grateful. And so between us there is a good understanding. Our greetings are always agreeable.

Were all farmers and manufacturers and merchants upright and honorable, each obeying the business injunction, "*live and let live*," there would be entire harmony. They are the dishonorable and dishonest of all classes that cause the bickerings, dissatisfactions and jealousies.

I desire the elevation of the agricultural classes, not because I consider them lower than the others, not because I would have them gain an advantage over

the others, but because elevation is good in itself. Again, I would be glad to see a change in certain conditions which, in some particulars, give to the others an undue advantage. How this lifting up of a great class may be effected, and how these adverse conditions may be changed, are the subjects which I have undertaken to consider.

Education is the great elevator of human beings. The masses of all classes are and will be educated in schools. Practically this is the only way. It is idle to talk about any other. Dr. Franklin knew but little about school learning, but he became well educated. The same may be said of Horace Greeley. But how few Franklins and Greeleys has the world produced. Here and there a poor boy has become eminent in manhood who mastered Euclid and the Principia with the light of pine knots. Such examples, however, are so rare that the rule becomes more impressive.

The education, then, meant by "book learning" must be got in schools, schools taught in houses, where books are used and teachers employed. Here is implied the necessity of a common school system,—just what we have theoretically, and practically just what has made and is making our most intelligent communities. The fact is patent that where the common school is most thought of, the best teachers employed, schools best attended, right there is the most intelligence, enterprise, morality and virtue. There is where the honest, intelligent voters are found. From such communities the demagogues take their appeal to the grog shops.

The common school system is, therefore, the farmer's educational system. It is the only system available for the masses. So self-evident is this that not a word need be said to prove it.

How can it be practically elevated, and thereby made to elevate the average farmer?

1. Brother farmers, it is of the first importance and all important that you see how absolutely are your children dependent upon the common schools for an education. They are absolutely shut up to this means, and as practically excluded from all others as if they were prohibited, by a law as unchanging and imperative as a law of the Medes and Persians, from all other means. The masses graduate from the common school. They do not dream of going, or desire to go, a step higher. Really it is as far as their means will enable them to go.

2. Seeing this you must realize that the better you can make the public schools the better will your children be educated and the higher positions will they be able to take in their mature man and womanhood. Your indifference will result in poor schools, and your children will be poorly educated and poorly fitted for life's momentous duties. Weigh this well. In one community the school-house is a shabby affair, the grounds around growing brush and weeds and covered with litter; the best recommendation for the teacher is that the teacher is got cheap; the best you can say for the school is that there is general dissatisfaction and a very slim and irregular attendance. The result is a well prepared field for all the vices, and for the triumphs of the craftsman and demagogue.

In another the school-house is neat and tidy; the grounds are enclosed with a comely fence; grateful shade trees are growing; there is a wholesome provision of convenient outhouses; the qualifications and not the wages of a teacher are the main consideration; there is a full attendance; all may be, and are, well satisfied. The demagogue has no show here. The lecturer is well received.

From the first of these communities go the dangerous classes. From the second, those which give stability to the State,—good government in town, county, State, and nation,—the development of science and pure religion.

The best of these conditions is adapted to the poorest communities. If the house be of logs let it be a “good log house,” well put up, with substantial and well fitting windows and doors, and comfortably seated. Let the surroundings be neat and all well kept. There is nothing to prevent learning going on in such a place.

See that glaring white two-story framed house standing about two rods from the road, with a crooked red fence in front, and the yard ornamented with bull thistles. Step along. Now look at that comely log house. The cracks glisten with lime mortar; a honey-suckle is trained over the door; a lilac bush stands here, a rose bush there, a bed of tulips in this place, and pansies in that, and here and there, not far off, an apple tree by the beech stump, and a cherry tree by the maple, and a pear tree by the basswood stump. Will you stop at the frame or the log house for good manners, good taste, refinement, intelligence? Nothing more is needed than that the log school-house bear the same relation to all other school-houses, both log and frame, that our log dwelling bears to all other dwellings.

3. A long time after John Quincy Adams had been President of the United States he was president of a school meeting. It is unfortunate every way for the well-to-do to become indifferent to common schools. The usefulness of the common schools is gone when they become “Jim Crow” institutions. “Level up” the schools. This requires the help of the more favored. There must be no flagging here. If men of affluence turn their backs upon the common schools, allowing them to fall into bad repute, they will be in just as bad order among the poorer classes. It will be poor religion, bad policy, and wretched patriotism to allow this.

4. The school fund must come of taxation,—in this way and no other. I lay this down as a palpable truism.

5. Then the scholars *must* go to school, voluntarily if they will, *made to go* if they won't—“taxation and representation.” It is robbery to tax me to educate the children and they not represent me in the school-room. Their attendance should be enforced by all suitable pains and penalties. Do you cry out against such an infringement of liberty? It is liberty regulated by law. And which is better, the liberty of the street, of bad associations, of the schools of vice which the idle are always sure to find, and of the jails and penitentiaries into which those who graduate from these schools are sure to step, or the liberty of the school-room, opening to a useful and honorable career?

5. All text books should be furnished free. This will relieve the poor of quite a burden, and poor children the mortification of having to use, as often happens, dilapidated and inferior books.

6. The State should comfortably clothe those whom the parents either cannot or will not clothe. Those who can but won't suitably clothe their children for the school-room should be taxed to reimburse the State. The supervisor should have charge of the whole matter, subject to an appeal to the county board.

This will sound strange, but do not vote too soon. Give the subject due consideration. There is no alternative between general enlightenment and general ignorance but despotism, open or disguised, and the worse if disguised. The world never saw anything quite as bad as the despotism of slavery and the bulldozers.

The State is giving to the University about \$60,000 annually, and to the Agricultural College about a quarter as much. No money is appropriated more wisely. The latter, especially, should receive twice as much instead of less. But how can such an appropriation of money be justified? On the ground of general benefits. But these benefits enure, notoriously, to those who least need them. As a rule, they are the sons and daughters of the rich, or those well-to-do, that attend these institutions.

John Jones is very poor. His daily earnings are his only resources. I need not draw the picture of his family to show that his children can't go to school for want of suitable clothing. Will the State furnish the means necessary for the purpose and make worthy and helpful citizens of the Jones children, or will the State leave them to their hard fate, suffer the consequences of their crimes, and finally take care of them in the penitentiaries? I am well aware that to ask for clothing for the poor, so that they may be schooled, is a far different thing from asking for stately halls and learned professors so that the sons of the opulent may learn the arts and sciences and polished manners. But I am sure I ask for what will more than equally benefit the State, dollar for dollar.

It is universal education on the one hand, or degradation, crime, and despotism on the other. The last is to be avoided by all means and at every cost. All the compulsion required must be used, and all the money needed must be raised.

7. "Read, write, and cipher." This is the curriculum. No graduation should be allowed until these are mastered. Nothing more should be enforced. These are the key that opens the doors of the world. With so much the depths may be sounded; the "hill of science" may be mounted. He steps into the companionship of Milton and Nasby. He can ask how there came to be coal within hailing distance of the pole, and what rounded the cobble stones. All measurements are in his grasp. With so much he is "master of the situation." Patriots, philanthropists, ministers of religion, open ranks at the school-house door and take off your hats as the boy with this diploma makes his bow, though in the State's uniform, and turns his face to the world. Grass will spring up in his footsteps. His fields will be green. Instead of suffering with hunger, his flocks and herds, with full stomachs and rounded bodies, will low with gladness as he approaches.

8. But a higher course should be provided for, embracing geography, English grammar, physiology, the elements of botany, natural and moral philosophy, geology, astronomy, chemistry, zoölogy, and history.

9. In every town of sufficient population there should be a central high school where these branches are taught. It should be supported out of the school fund, and be a part of the common school system.

10. What can be done with the technical names? Here we confront an appalling obstacle. In the sciences of botany, zoölogy, and geology, especially, we are brought face to face with nature. Surely everything should be made as plain as possible. But to unlettered folks the names used in the text books are as unintelligible jargon as the language of the Hottentots. They may have mastered the English classics, and be as blind as bats and owls in sunlight before these names. And this is precisely the condition of the masses of intelligent readers. Everything is described in good, plain English, but named with unpronounceable words, as meaningless as Cicero's orations to a wild Sioux Indian. And the meaning is absolutely out of their reach. They can't get it from the dictionaries; they can't get it at all.

Scholars claim that these names should be in a language used by scholars all over the world. Without doubt this is very convenient for scholars and very necessary. I can see that if there were "*no two ways*" this would be the best way. The coöperation of scientists speaking different languages would hardly be possible without a common technical language. And there is no measuring the importance of this coöperation. But, Prof. Agassiz, "we, the people," want to learn the results of your researches as well as the coterie of learned men to whom they are so very interesting. And Prof. Cook, when you write in the Farmer about insects, if it is a sow-bug you are describing, please say *sow-bug*. After you have said sow-bug for the benefit of the masses, you may then, for the benefit of the learned, say *porcusanammallisanus*, or some better word, if you can find one, that it will trouble them less to learn the meaning of.

Simply, then, for these schools, which are "of the people and for the people," we want scientific text books in *plain English*, names and all. It would do no harm to append in parenthesis the equivalent Latin or Greek word, but the English name should stand first. It should have the place of honor. When allowed at all it has stood in brackets and small letters. It has been in disgrace long enough. *Hirsutissimus* (hairy). This is the arrangement on the books, if hairy is given at all. *Hairy* (*hirsutissimus*). This is the arrangement that the people want. A hairy dog, a hairy horse, a hairy plant, a superb hybrid, not *hybridus superbus*.

A little honest, patriotic work is needed by good English scholars. The man or men who will put the names of Gray's botany, Dana's geology, etc., into good English, will command the high regard and love of all intelligent English people.

What is needed, then, are good schools, a universal attendance secured by just as much compulsion as necessary, competent teachers and suitable text books, good school-houses and pleasant surroundings. These secured, everything else necessary for the farmers is assured. The giving up of these insures them degradation.

DISCUSSION.

Prof. Beal.—It is a mistake to suppose that only the sons of rich men attend the University and Agricultural College. Many students in both, particularly in the latter, are poor.

Prof. Tracy.—I do not have as much faith in compulsory education as is expressed in the paper read. I would advocate increasing the inducements to attend school, as would be done by limiting the political franchise to those who can read and write.

Prof. Beal.—I believe compulsory education to be beneficial; children do not at first go to school from choice.

Mr. A. D. Dunlap.—As I understand Mr. Curtis in the paper just read, he does not advocate the compelling of the children to attend school, but compelling the parents to send them, and that I believe to be right and beneficial.

I believe in a thorough agricultural education. I came from the east with a prejudice against agricultural colleges, but have no such prejudice now. Education is too broad for a man to master everything. We need schools that teach specialties, and if agriculture is to keep pace with other occupations we must have schools to teach agriculture that farmers may be able to do the right thing at the right time and know why they do it. I would like to see a higher educational qualification necessary for entering the Agricultural College, as it would

increase the influence of the College and its graduates. Yet I believe the College is doing an excellent work, and I hope the Legislature will appropriate for it all that it now asks for.

Secretary Baird said that he believed every member of the Faculty would like to see the College course more advanced, but for one thing, viz.: It was the design of the College that it should take hold of boys where the district school left them, and to demand a higher qualification at the present time of those who sought to enter the College would be to place a wide step between that institution and the common school and thereby place the College beyond the reach of many of those for whom it was specially designed.

Prof. Kedzie corroborated what was said by the Secretary, and added that the Faculty, by being very thorough in the examinations for admission, were doing what they could to draw the common schools upward.

Prof. R. C. Kedzie gave an address on "Electrical Conduction," accompanied by a number of interesting illustrations. See lectures and addresses at the close of this record of the Institutes.

AFTERNOON SESSION.

Prof. Beal read his paper on the "Apple Orchard." See lectures and addresses as above.

Prof. R. C. Kedzie lectured on "Green Manuring." See lectures as above. These lectures and discussions on the topics occupied the afternoon.

EVENING SESSION.

Secretary R. G. Baird's lecture, "The Farmer's Home." See lectures as above.

The following essay on "Poultry Keeping" was read by Mrs. A. B. Dunlap: *Mr. President and Members of the Institute,—Ladies and Gentlemen:*

I am here this evening as an evidence of my high appreciation of the honor conferred upon me by an invitation to speak at this Institute. I am entirely unaccustomed to such a position, but have accepted it the more willingly, though deeply impressed with my disqualifications hoping my example may encourage other ladies to make their first trial when they may be so politely invited.

The subject given me is poultry. I will entitle my talk

THE ROMANCE OF POULTRY.

To me the world is full of romance and poetry. The bird is a beautiful gift, not to be lightly valued. It possesses a high utility, deeply affecting the happiness and the interests of us all. Its sweet-toned music, its poetry of motion, its beautiful form and plumage cheer the most desponding. Birds are useful as teachers. What models of conjugal fidelity and parental affection! With

vastly less of brain and little of muscle, the birds are our superior in music, motion, sight, smell, fidelity, and honesty.

Nothing looks more comfortable; nothing more beautifies and enlivens the home of the farmer than a few select, well-kept fowls. There are higher utilities than mere ministries to the purse and the stomach. In looking at such a gem of perfection as a beautiful bird, base and groveling must be that soul that cannot be lifted by the view higher than the thought of a baked fowl, a chicken pie, or a boiled egg. The elaborate beauty so profusely lavished upon the bird creation shows, beyond a doubt, that it was designed for soul food no less than to gratify the palate, important as the latter may be. There are few creatures that minister more to our comfort in sickness and in health than domestic poultry. Considering how interesting and profitable its care, it is a little surprising that so few young people make poultry a study. The solution may lie here, that they were not early taught to look at the outward world as a great and beautiful picture-book, ever changing the scene, yet never giving one view commonplace or dull; not taught to look at nature as their great and good-hearted mother, ever at work to please good children. Shooting up the blade of grass, opening the blossom bud, notching the tiny leaf and stirring it to music, forming and tinting the fleecy cloud, and then blowing it away for others to come, watching the tender plants and when thirsty distilling upon them the gentle and refreshing rain which she holds in her leaden clouds, and then, as if never tired of showing forms of beauty, spanning the heavens with a prismatic bow. An education to see beauty and love in nature, may we not consider a prerequisite to find *pleasure* in and to successfully manage a poultry yard? The tender of the birds must see in them a beauty, a loveliness, a charm; must find in them a pleasure; must drink in their musical notes, their ethereal language, indicative of their condition and their wants, as an entertainment, the minstrelsy of the home lawn. The farmer's "poet laureate" is the bird.

To make any business profitable it must be understood. To find money in poultry,—and that is what the American has the credit of seeking in his every enterprise,—the conditions of its welfare must be assiduously cared for. Poultry management is with some a success, with others a failure. This difference, other things being equal, must be owing entirely to care and skilled attention, or the neglect of it in their management. A "liberally educated" gentleman once said to me, "I can't understand why we have no eggs; we have hens and they have nothing to do but to give us eggs." He had yet to learn that they could return only an equivalent for what they received. Egg-making is no easy work, and hens will not do much of it without high feed. That fowls cannot be remunerative if half fed is obvious. "*Ex nihilo nihil fit*,"—from nothing nothing is made. An almost daily production of an article so rich in nitrogen as an egg,—the very essence of animal nourishment,—must demand an ample supply of adequate food regularly given. And yet some varieties of fowls may be over-fed, rendering them lazy and non-layers. To work well they should be neither lean nor fat. Every observer must have noticed a marked difference in the color, flavor and richness of eggs. May not this be attributable to the feed as much as to their breed? Their style of living shows itself in all their productions,—eggs, flesh, and feathers as well. When a fowl is in a good condition, its downy, goose-like feathers indicate this to the observer. Fowls fed on onions, decayed vegetables and barnyard pickings will doubtless reproduce such flavors; while those fed on clean, sound grain and fresh vegetables will have the better flavors. Poultry, like all animals, have organs,—digestive, respira-

tory, and circulatory,—subject to organic laws. When these laws are violated disease will inevitably follow. We hear of catarrh in chickens, chicken cholera, diphtheria, dysentery, fowls eating their feathers, gapes, gout, pip, rheumatism, roup, vertigo, and last, but not least, vermin. I know but little of these ailments from experience or observation. I am a firm believer in the adage that “prevention is better than cure.” By far the greater proportion of poultry diseases arise either from cold, wet, neglect of proper food and clean water, or of persevering cleanliness. As health is the first condition of success with poultry, this fact presents the key to the whole matter of their profitable management. It is reasonable to suppose, and it is admitted by experienced keepers, that a large number of fowls, with proper management, will prove proportionately as profitable as a small number; that want of success with a large number of birds is most frequently caused by neglect of cleanliness, resulting in disease. Vermin is the greatest annoyance of fowls, but the bird being a clean and active animal, it will keep itself free from this, or mostly so, if sufficiently furnished with dusting boxes. Give them an abundance of ashes and they will faithfully use them. Warren Leland practiced fumigation to exterminate hen vermin. Another fumigates with roll sulphur; others use whitewash to which is added a little carbolic acid, sprinkling the nests and perches with carbolic acid diluted twenty parts water to one of acid.

In regard to a poultry house there are as many fancies as there are poultry keepers. The march of improvement in the building of chicken houses seems as apparent as in most other things. Warmth, dryness, and pure air are indispensable in a poultry house. The best soil on which to build for fowls is a sandy one, resting upon gravel loam, since this variety of soil retains the least moisture, stagnant moisture being a fruitful source of disease. Its size should be adapted to the number of fowls to be enclosed. “A room from eight to ten feet square is large enough for a roosting and laying place for twenty-five fowls,” says one; another that “its size should allow about six square feet for each fowl.” The great danger is from over-crowding, allowing the birds too little range.

The roof, sides, and floor are all the better if constructed double. If the walls are plastered the protection against vermin and cold will be greater than when otherwise. It should be lighted by the morning sun, be kept thoroughly *ventilated*, and in winter artificially warmed. The sunny side, except of the nest room, should be glazed the entire length. The perches should never be more than four feet high and arranged on a level, checking the birds’ ambition to get the highest place. Ladder-like perches, rising from floor to ceiling, are highly objectionable. Heavy fowls will walk up to their night’s rest, but will take the shortest way down in the morning. The roosts must be easy of access. The nests should be kept dark that the hens may reach them unperceived. Movable boxes are best for their nests. Chopped straw is a good material with which to fill the nest boxes, and should be *clean*. The feed-boxes and water-troughs should be so protected as to keep their contents clean, and yet allow the fowls easy access at all times. Boxes of dry ashes or earth, gravel and lime, form an indispensable part of their room’s furnishing. My poultry house is thirty-two feet by sixteen, with four equal compartments. The partitions are of slats, so that the birds are all in sight of each other, preventing any estrangement when kept separate, as they may be by means of a door to each room. Standing at either end of the house one may see the occupants of all the rooms at a glance. On the north side is a hall four feet wide for the storage of feed,

passage to the rooms, and nest boxes. On this side are two ventilators four feet long and one foot wide. These are opened daily during the winter, and as frequently as the air becomes vitiated. Fowls have not that aversion to ventilators that too many school officers manifest when building houses in which to confine their children six hours a day. The end room contiguous to the garden has a large covered box for receiving the droppings, which are removed in the spring to the garden from a door on the outside with which this box communicates. There is also a box at the entrance door in which the fowls soon to be killed are confined to fast for half a day or more before killing. On the south is a range of windows extending the whole length. Above each window is a sash ventilator movable at will. The perches, four feet long and three inches wide, are placed endwise to the windows, and eight inches below them. The fowls greatly enjoy these winter days, the full, unobstructed sunlight completely covering each and all. Nothing is more invigorating and pleasant to them than this all-day sun bath. Under the perches are shelves placed six inches below in the rear and seven inches in front to catch the droppings, which are removed every morning and evening, thus preserving the floor comparatively clean, and the house free from taint. The perches are two feet and a half high. A little in front of them are placed the feed boxes,—five feet long, one foot wide and fourteen inches high,—which serve as a step between the floor and the perches. Each room is furnished with a feed box, water trough, and boxes for ashes, lime, and gravel. There are, I believe, twenty ash boxes scattered through the building. The fowls may be seen revelling in them at all hours of the day. At times the air is dense with ashes. An addition was found necessary for a sitting-room. This joins the main building and communicates with it. It is sixteen feet by eight, making the entire length forty-eight feet. This, you will see, makes six hundred and forty square feet in the hennery. My stock birds number one hundred, thus allowing each fowl a fraction over six square feet. The sitting room has an earth floor; that of the main building is double of one inch boards. Its walls are lined with the view of filling in with saw-dust. Last winter they were covered with a pasteboard material prepared for such a purpose. They will either be filled as first intended, or plastered. The latter I think preferable. The hennery has a chamber for storing articles for future use, also a little cellar for the fowls' fresh meat in the summer. There are two covered yards or runs joining the house on the south, which the fowls greatly enjoy when the weather favors. The entrance door is protected by a "storm-house" four feet by four, which is of no small value, particularly in the winter. The sitting-room is utilized by the chickens as soon as they graduate from their nursery coops.

My feed for the morning meal consists of wheat bran, buckwheat bran, corn meal and boiled potatoes mashed hot in the bran and all scalded. To make variety, these are alternated. Their evening meal is of grain in the kernel,—wheat, buckwheat, corn, and occasionally oats. Some green vegetable and chopped bones and broken meat are given them daily. At first their vegetables were chopped for them, but this proved to be mistaken kindness. Cabbage-heads laid before them will entertain them more or less all day, and they come eagerly to them with a will to work. At evening there will be nothing left but the stem, showing how happy they were in working for a living. Like wise people, they like to be well employed.

They are quite intelligent and affectionate in their way. At the first sound of the hatchet upon the chopping block they will gather in from all parts to-

pick up the fine bits of bone and meat as they drop upon the floor. Some will even jump up and help themselves from the block, singing for the pay. Great care is perseveringly taken not to frighten them, and they are as gentle as kittens. They will allow their eggs or their chicks to be removed from under them by passing the hand gently under the breast.

To secure strong pullets for winter, *late* hatches should be avoided. I prefer May and June in this climate to either earlier or later time. To obtain early chicks requires a greater outlay of time and care than present prices will justify. Two years ago I was so fortunate as to have three hundred chicks come off in May. I manage to sit a number at the same time, always giving them their eggs at evening. There is this advantage in having a number come off at the same time, that some of the hens can be set free, and not subjected to the wear of nursing.

A fire is kept in the building sufficient to keep the temperature above freezing, which is indicated by their drinking water. The stove pipe passes through all these rooms, so that a little fire makes the whole house comfortable.

To obtain good stock is all important; and since we have here the best breeds that Europe and Asia can furnish, this is not difficult. One of the very best breeds of native fowls is the Dominique. Its color is a slaty blue all over the body. The eye is bright orange; feet, legs, and bill a yellow or buff. They are good layers, good sitters, and good nurses. Their beautiful appearance is quite an acquisition to the yard. The Dorking is a favorite fowl with many, but to me their *white* legs is an objection. The Houdan, a French variety, has been sold in our State for fabulous prices. I have had this variety and also the Black Spanish, but their *black* legs were not to my fancy. I believe the *yellow* leg indicates the qualities of good layers and sweet, tender meat. The Shanghai I have tried and find it has this disqualification: flesh coarse-grained, neither tender nor juicy. The Brahma is an Asiatic breed possessing positive merits. History says it was brought to this country by a sailor from the banks of the Brahmapootra. It is said that the English highly prize this breed of beautiful fowls, a pair of them having been lately sold for \$350. My fowls are the Light Brahmas crossed with the White Crested White Poland. The Dominique still retains a limited place in the yard. This variety first shared with us the privations of the woods, and I never discard an old and tried friend.

It is thought by some that more eggs can be obtained by mixing breeds than by any other mode; that it also promotes the health of fowls. My fowls lay well and are extremely healthy. An ailing fowl in my hennery is a very rare exception. The Brahmas are objected to by some on account of their clumsiness, supposing them liable to break their eggs in getting on and off the nest. I think in all such instances the nest must be at fault. With low nests and short straw, I have often admired their almost human caution at such times. They are hardy, bear confinement well, are good layers, sitters, and the very best of nurses. A broad, deep body, profusely feathered thighs give to the Brahmas' mother an advantage over almost any variety when "she gathereth her chickens under her wings." She is also very gentle and attractive. The Light Brahma is the variety selected by Warren Leland, although he had tried numerous varieties, to supply the table at the Metropolitan Hotel while in his charge. Nicely dressed, it makes a tempting roast, pie or fricassee. The White Crested White Poland is considered one of the most hardy of all the crested varieties. It has the two-fold merit of being perfectly beautiful and one of the best of layers. Its flesh also is remarkably fine. It possesses the virtue of

being peculiarly susceptible of attachment to its feeder. The White Leghorn bears an excellent reputation for desirable qualities, minus the avoirdupois. Should I try another variety this would be my first choice. It is quite a demand upon one's credulity to credit the assertion that every variety of the domestic fowl has originated in a wild bird still existing,—the common Jungle Fowl of India,—though such a fact is not more wonderful than that a draft horse should have descended from the same original stock as the Arabian.

To properly dress a fowl may deserve a passing notice. Visit any meat market at the rush of poultry-selling and you may well turn with disgust from the leprous looking objects strung around to tempt the visitor. A neatly dressed fowl is not the work of careless haste. To *well* dress a fowl taxes largely both time and careful attention. To pay no more for such poultry than for the slovenly dressed is but giving a premium to neglect. The practice of feeding fowls shortly before killing to increase their weight is morally wrong, as the undigested food soon enters into fermentation. Fowls should be left to fast from twelve to twenty-four hours before killing. Poultry thus prepared will keep longer, present a better appearance, and above all will show honesty.

I am not prepared to give an accurate statement as to my yearly number of eggs obtained from a fowl. There is not a day in the year but the egg-basket comes in with more or less fresh eggs. My net profits from the fowls have been small owing to the outlays for poultry house and fixtures and the high price of corn. One source of profit is the fertilizer obtained from the hennery. Warren Leland estimates its value at one dollar per fowl.

I have not touched upon the *fancy* points of the domestic fowl, thinking the practical would be more acceptable at our present state of hen culture. Neither have I given space to artificial hatching, since I have not experimented in that direction. I have had but little experience with ducks. I had a few of the Rouen Duck and a few of the elegant Aylesbury species. I kept them two years or so as a source of amusement. Their beauty of form, of plumage, and of motion made them a continual entertainment. We made for them a pond, but it required too much care to keep it in a proper condition. I had for a time a pair of Bronzed Black Turkeys, but the turkey-cock was so tantalizing to the other fowls that I was more than glad to part with him for his unfriendly disposition.

My first study of poultry management began 1872. I wonder now that a person could be so ignorant on the subject as I was at that time. I consider myself still a novice in the business. I find that every department of nature to which I turn my attention opens up before me like a panorama, widening, deepening, and varying in interest, so that I am ever on the threshold of her temple, wishing to see and know more. Thus nature rewards her votaries,—leading them onward and upward. Study her not simply for the bread and butter which she will not withhold, but for the inspiration of soul as well, which her loving study will infuse. Can we suppose that the gifted Baroness de Lina, when she entered upon the poultry business, had the least shadow of a conviction that *her* poultry house would, by the most intelligent authority, be honored as “one of the best establishments in France?” Or that the child Rosa Bonheur with a piece of dough in her little hand, standing on the barnyard fence, trying to fashion it into a calf's head, thought for a moment that this simple beginning would culminate in the halo of glory which now encircles her name, as the “unrivalled painter of animals?” The “cattle pieces” are the admiration of the world. In her simple, well-adapted costume, giving her the appearance of a chore boy,

she was shearing her sheep that she might the better reproduce them on canvas, when an admiring artist from over the sea called to give himself the pleasure of seeing so gifted and celebrated an artist. She accompanied him to the parlor, furnished him with subjects of entertainment, and begged him to excuse her absence till she might finish shearing a sheep that she had left begun. I may say quite positively that your speaker little thought when starting in her humble way four years ago, with a few fowls in a log house ten by ten, and then gradually enlarging as their wants made it necessary, and lately introducing them to more comfortable appointments, unheralded by pen or friend, that her modest work would ever introduce her to so high an honor as the present,—standing here to speak to the sovereigns of the land, for such is the intelligent, well-read farmer.

The sentiment, when general society shall have become wiser, will doubtless become universally approved, that familiarity with the most humble occupations of agricultural life is not inconsistent with the highest refinement of taste and the most improved culture of the mind and manners.

The world is full of unspeakable loveliness, and “eyes annointed read” the glories of a creation over which “the morning stars sang together.”

Living in the outer world as the farmer does, and whose wife and daughter may, they can study nature in all her varied forms of figure, shades of color, strains of music. Her mountain landscape pointing heavenward, and the mighty forest depths quivering in the breeze and howling in the tempest; all these grand, ennobling, and ever varying sights and sounds is but a part of the glorious entertainment which nature grants her worshippers. These are blessed influences which grace the soul with a perennial bloom which will grow more and more beautiful as the ages of eternity roll on. These sublime influences inspired genius in all the past. The “Landscape Pieces” of Claude Lorraine, the “Pastoral Symphonies” of Beethoven, the sublime description of a thunder storm on the Mediterranean sea by the “Sweet Psalmist of Israel,” are but so many gems, each of its kind wrought out by a close, admiring, and loving converse with nature.

Address by Prof. W. W. Tracy:

“SEEDS: THEIR FORMATION AND DEVELOPMENT.”

No one has failed to notice the variety in the flora of every country. The woods on a single acre are rarely all of the same species, and underneath them all we find an ever-varying, ever-changing carpet of small plants, which grow up and bloom and die, only to be replaced by others. The number of known species is variously estimated by different botanists at from 90,000 to 130,000, and while some of them (like that most beautiful of orchids, *Disa grandiflora*, which grows naturally only on Table mountains near the cape of Good Hope) are confined to very narrow limits; others are found almost everywhere, like the silver weed (*Potentilla anserina*), which grows so abundantly about our bay, and is found not only in Grand Traverse, but everywhere to the east of us from Pennsylvania to Greenland, to the west from Oregon to Behring's straits, while it is common all over Europe from the Mediterranean to the Arctic sea, and in Asia everywhere north of the Altai range of mountains. When we consider the millions upon millions of individuals comprising some species, and that if all of the possible descendants of many single plants should grow, in a few years they alone would more than occupy every inch of the land, we do not wonder at the fact of this variety, and are prepared for the statement of Flint, that over thirty dis-

tinct species of grasses have been found growing on a single rod of English turf. Is this variety of any use and importance? We answer yes, for the entire animal kingdom subsists either directly or indirectly upon the vegetable, and in every country and in every clime does there not need to be this variety to meet the varying wants of different animals? By it the savage, whether his home be in a temperate or a torrid clime, finds all his wants of food and raiment and shelter provided for. But independent of its usefulness do we not find ample reason for this variety in the beauty it adds to our earth? Is not this intermingling and blending of the different forms and colors one of, if not *the* chief element of beauty in the landscape? How is this variety produced? A plant is a *living, stationary* organism, which can only with the greatest difficulty be moved from place to place. They cannot, like the clouds above us, be drifted hither and thither by the winds, now forming in dense masses, and then blotted out of existence to be reformed in another place. Nor can they, like animals, move singly or in vast herds from place to place at their own volition. And yet grave and reasonable are the fears expressed that much of the good of our "Centennial" will be balanced by the introduction through seeds in the packing of foreign exhibits of pernicious weeds which in a few years will spread over the whole country. How is it possible since plants are so stationary in their character that the descendants of plants growing this summer on the Centennial packing grounds at Philadelphia can in a few years be found from Maine to Oregon? The answer comes promptly *by seeds*. It is by seeds then that all this much needed variety and intermingling of species is produced, and since it is upon seeds, too, that the human race mainly depends for food, a little time spent in the study of their structure and formation will be well spent. Botanists tell us that a plant is made up of root, stem, and leaves, and that all its various organs, no matter how diverse in form, texture, or color, may be referred to one of these three elementary parts variously modified to meet the desired end; that a potato is simply an enlarged and modified stem, a beet an enlarged root, and the scales that enclose the buds of trees, or the different parts of the most brilliant flowers are simply modified leaves. In the language of Prof. Gray, then, we may say, "The Great Author of nature having designed plants on one simple plan, just adapts that plan to all cases. So when any special purpose is to be accomplished no new instruments or organs are created, but one of the three general organs of the vegetable, root, stem, or leaves is made to serve the purpose and is adapted to it by taking on some peculiar form." This Prof. Prentice of Cornell University used to call the key-note of structural botany, and I must beg that you will keep it clearly in mind, no matter how changed in shape, color, or texture, every part of the plant may be referred to one of the three general organs,—root, stem or leaves.

Of these three organs it is the root, and the root only, that gives the plant its stationary character; the leaves and branches can be moved as freely through the air as any inorganic matter; but the home of the root is in the cool, damp earth, from which it cannot be separated without the loss of a greater or less proportion, and the injury of what we do secure. The root, then, seems to be the insurmountable obstacle in the way of the easy distribution of plants. *Is it an essential part of the plant?* We answer, for its full growth and development, yes; upon it the plant depends for its food and drink, but it is not essential to life and some slight degree of growth, provided the nourishment and moisture it should furnish is obtainable in some other way. The other parts of the plant, the stem and leaves, take on a great variety of forms. One of the

most common is that of buds, which consist of a minute and undeveloped stem covered with equally minute and undeveloped leaves, and usually enclosed in some protecting envelope. These buds as a rule remain for a greater or less period in a dormant state until they are surrounded by favoring conditions, when they throw off the protecting envelope and speedily develop into branches. While in this condition they require almost no food or moisture, so they may be severed from the source of trees,—the root,—without danger, and then can be easily moved from place to place, and if when surrounded by favoring conditions they are so situated that they can immediately obtain needed nourishment, will grow as freely as if on the parent stem. We take advantage of this in budding, in which we simply remove one of these mature and dormant buds and place it in such connection with the circulating nourishment of the stock that it may absorb and appropriate some to its own use. Or in some cases, as that of the currant, where there is a good supply of food stored in the stem, we remove it and place it in the damp earth, where it exists upon this food until it can form roots of its own, and thus become a perfect plant.

If, then, we can secure to these dormant buds a supply of nourishment either within themselves or so that it can be immediately available when needed, the problem of the easy distribution of plants is solved. Now, just this result is obtained in the seed. We all know that buds vary greatly from the long scaly ones of the beech, the large plump ones of the slippery elm, the minute and downy covered ones of the sumac, so that the form, size, color, or covering of the bud is not essential. The leaves vary even more than the buds. These buds are usually found in the axils of the leaves, but are sometimes found in other positions, as for instance in a plant called *Bryophyllum prolijerum*, the leaves of which when placed on the damp earth will start a bud from each notch, and if left undisturbed these buds, nourished by the thick fleshy leaf, speedily take root and become perfect plants. Now, as the shape of the leaf is immaterial, suppose in another case we have a different shaped leaf, which, instead of remaining expanded, closes upon itself until the two edges of the leaf touch and become united. Now, suppose buds be distributed along these united edges of the leaf, which, instead of starting immediately, as on the *bryophyllum*, remain dormant like other buds, in which case they would be deprived of the necessary food for starting by the drying up or decay of the leaf. So we must provide some which will remain unchanged during the dormant condition of the bud, but become immediately available when favoring conditions cause the bud to start. To make sure of this food being ready just when the buds need it, and not before, we must store it either in or around the bud that it may be subjected to the same influences. In this case we store it in the two outer leaves, and the supply being large while the leaves are small, it so distorts them that they lose all resemblance to leaves and become simple hemispherical masses. Most dormant buds are protected by scales or otherwise, and to furnish this protection we enclose our bud in a soft and pliable covering, and this again in another thicker, harder, and better fitted to protect it from injury. This done, and as you see, we have a simple pea-pod filled with peas. It does not complicate the matter in the least that this enveloping leaf upon which the buds or peas grow is called a carpel; the outer coat the primine, the inner the secundine, the two food-gorged leaves cotyledons, the short stem a radicle, the rest of the bud a plumule, and the whole bud an embryo. The whole processes of seed formation as compared with that of buds are just as simple as I have described them. In some cases the food is stored around instead of within the

bud, and then the whole bud and food is enclosed within the protecting envelope, and in many cases, instead of the enveloping leaf remaining thin and foliaceous like the pea, it in some contiguous part becomes thickened and fleshy or thickened and hard as in the pumpkin, apple, etc. In the case of the pea the leaves containing the food are so distorted that they can never be of use as leaves, and so do not come to the surface, while in others like the pumpkin they not only appear above ground, but perform all the offices of a true leaf. In other cases, like that of the beautiful climber, *coclea scandens*, the supply of food is so limited that it is only with the greatest care that it can be started from the seed, the plantlet starving to death before the necessary roots to collect other food can be formed. We come now to the distribution of seeds, and this subject is almost endless, for the seeds or fruit of almost every species is specially adapted for distribution in some particular way. The means made use of are, first, animals. Many seeds or fruits are provided with bristles or awl-like projections which are barbed so as to prevent their being removed easily from any thing they may penetrate. Such seeds attach themselves to the hair of a passing animal, no matter how sleek they may be, and are carried long distances before they are dropped or brushed to the ground, thus distributing the seed rapidly and effectually. Burdocks, sticktight, and tory burrs are illustrations. Other seeds are surrounded by a fleshy fruit which is the food of some animal. In such cases the outer seed coat is usually hard and almost impervious to water, so that it can remain in the stomach and intestines while the fleshy fruit is digested, and they are then voided unhurt in the excrement miles, and in the case of migratory birds hundreds of miles away from the plant that produced them. Many seeds of marsh plants are distributed by falling to the earth and becoming mixed with the mud that adheres to the feet of some passing animal. The wind is the means for the distribution of the greatest number of seeds, and very various are the arrangements to secure it. Some have a portion of their outer coat split up into little hairs or down which make the whole so buoyant that they float along on the lightest breeze. Others have broad wings which sustain them, while still others have smaller wings, but so placed that the seed can move downward only as a propeller wheel moves through the water, and are thus sustained until drifted long distances, particularly as such seeds are usually those of tall growing trees like the pine. Some seeds are especially adapted for water transportation, and are surrounded by a light spongy mass, which is enclosed by a thin, hard coat impervious to water. Such seeds will float long distances, even from continent to continent, unhurt, and when cast upon some island shore the outer covering gradually decays and allows the water to come in contact with the seed, which germinates and grows. But plants are not always passively distributed. Many seed pods are so constructed that by the drying of some parts they burst open and scatter the seeds in all directions. The wild touch-me-not and crane's bill of our section are illustrations, while the fruit of the Brazilian sand-box tree bursts open with a noise equal to that of a pistol and scatter the seeds to a great distance. But to return to the structure of the seeds. I have shown, or tried to show, that seeds are not, as many farmers seem to regard them, simple inert matter, and although it is necessary to add them to the soil to produce a crop, it is only so in the same way that manure or water is necessary, but are living, although dormant parts of the plant which produced them, and the fact that the parent plant, or rather the balance of it, is dead does not affect their existence or their relation to it at all, any more than the death of the original Baldwin apple affects the thousands

of trees of that variety that bloom in our orchards. Again, it is just as impossible that any combination of inanimate matter, or of circumstances of soil or climate, can generate or produce a seed than that the same conditions should produce a perfect, fully developed tree.

What would we farmers think of the man who when he wished to graft over an orchard or start a nursery should take buds indiscriminately from any scrub apple tree that might be convenient? We should call him a fool, and yet is not that just what we are doing when we take our seeds (specially prepared buds) indiscriminately from the bin to the crib?

Should we think he had made much improvement if he simply selected the largest and plumpest bud he could find, without any regard to the tree it grew upon? But do we not do just this thing when we take the largest, plumpest kernels of wheat without any regard to the length of head or the tillering habit of the plant upon which it grew? But you will say a bud or a branch always remains true. A Baldwin apple tree always produces Baldwin apples, while a plant from a seed is not always like its parent. I answer this is not invariably the case. I have a geranium at home, one branch of which always bears leaves distinctly marked with white, while the balance of the plant is plain green. The beautiful variegated abutilon did not come from seed, but is a variation in a bud or branch. There is a greater or less tendency in all buds to sport, and in those that become seeds because they form roots of their own with little of the parent plant between them, this tendency has a better chance to develop itself; but I very much doubt if in the case of our grains this tendency amounts to much more than the variations produced by the stock in which we insert our buds. And if we should pay the same attention to the selection of our seed wheat that we do to the selection of our apple and pear buds, the crop over an entire field would be as uniform as a crop of Baldwin apples or Flemish Beauty pears; and I would cite Hullett's experiments with wheat in proof. Does not this view of the case, that a seed is simply a bud from the parent stalk with possibly a slightly greater tendency to variation than if it had developed into a branch, make the question of the selection of seed of the utmost importance, and has Prof. Beal in his lecture on the subject stated its importance any too strongly, and ought we not to go home determined that in the future we will obey the maxim of the Grange and "sow some of the best for seed," making our selections not from cut or bin, but in the open field where we can see the entire plant which we wish to increase next year.

During the evening Judge Ramsdell by request read an original poem on the "Origin of the Grand Traverse Region," which was highly appreciated.

The committee on resolutions presented the following, which were unanimously adopted:

Resolved, That we tender our hearty thanks to Professors Kedzie and Beal of the Agricultural College, and to Secretary Baird of the State Board of Agriculture, and all others who have aided and instructed us in agricultural science during this Institute.

Resolved, That in our opinion a liberal appropriation should be made by the State for the support of a permanent experimental department in horticulture and agriculture, to be attached to the Agricultural College.

After the adoption of the above resolutions, and a piece of music by the band, the Institute was declared adjourned.

YPSILANTI INSTITUTE.

This Institute commencing Tuesday evening, January 23d, was held in "Light Guard Hall." This commodious hall was well filled throughout the Institute, and during some of the sessions many were unable to find seats.

The first session was opened with music, and prayer by Rev. Mr. Boyden.

The President, Hon. J. Webster Childs, made the following opening address:

LADIES AND GENTLEMEN:—When the idea of holding Farmer's Institutes was first entertained by the State Board of Agriculture, it was considered somewhat of an experiment. But the Board believed that the farmers were ready to respond to their invitation; to join with them and the Faculty of the Agricultural College in calling and conducting such gatherings. And in this they were not mistaken. The complete success of each and every one of those held in the various parts of the State last winter, not only in point of numbers attending them, but in the lively interest manifested both by farmers and others in the communities where they were held; and the earnest manner in which our intelligent farmers came forward and took active part in the conduct and discussions of those meetings was a source of great gratification to the Board and Faculty, and to all others interested in promoting the important interests of agriculture. It is also a satisfaction to know that the published reports of those Institutes are being sought for and eagerly read by many hundreds of our farmers who had not the privilege of attending the meetings. And we are pleased to learn that the first two of this winter's series, held last week, were in every respect a success. And also that in various parts of the State similar Institutes are being held other than those appointed by the Board,—called and conducted by the earnest and intelligent farmers of the different localities.

Labor is the true source of wealth; and a larger proportion of the people of our country are, and of necessity must and should be, engaged in agriculture than in all the other industrial pursuits combined. And while we would not undervalue any of the laudable industries, all of which are of so great importance to society, still we think we are not unwarranted in saying that none of them are of so *great* importance, or lie so nearly at the foundation of national wealth and greatness, as does the tilling of the soil. And there is no industry or occupation the prosecution of which is calculated to be more interesting to the *intelligent* and *thinking* mind, or that opens a broader field for thought and investigation, nor is there any that more *surely* rewards for such investigation.

It is a very great mistake to suppose that farmers need, for the most successful prosecution of their calling, less mental culture, less knowledge of those sciences, on obedience to whose laws depends so entirely their success, than those connected with other pursuits. But such, to a great extent, has long been the generally received and expressed opinion, and in that opinion farmers themselves, as a class, have in the past coincided. They educated their sons that were to be teachers, doctors, lawyers, engineers, or merchants, but failed to see the necessity of an equal amount of mental culture for those who were to follow the plow. After leaving the district school, which often was at quite an early period in life, the balance of the young farmer's education was to learn to farm as his father farmed. To be sure, this practical experience was not with-

out its value, and prepared him to be as good a farmer as his father was, but *no better*.

Not having obtained the mental discipline nor the awakened desire for investigation that a scientific education gives, surrounded in his farmer home with little that was calculated to awaken thought in the uncultivated mind, having the advantage of a very limited library if any, or papers, especially such as were devoted to agricultural interests, daily tired with daily toil, is it any wonder that he did not more rapidly push his investigations of those intricate laws of nature that underlie his calling? No doubt the provisions of nature are ample and sure, so that with proper management the field need never diminish in its productiveness, cereals, fruits, and vegetables be constantly developing greater degrees of beauty and excellence, and the domestic animals, by a thorough knowledge of the laws that govern their breeding and care, and a careful compliance with those laws, be steadily improved and brought towards a greater degree of perfection and consequent profit than has ever yet been attained.

Great advancement has been made, especially during the past few years. But is it strange that it has not been more rapid, or that other callings have in many respects outstripped us in the race? With all the improvements that have been made in the style of farming and in agricultural machinery, in the quality and variety of our grains, vegetables, and fruits,—in our flocks and herds, still the facts will warrant us in saying that in many, if not all, the various departments of manufacture and mechanic arts, in commerce, in merchandising, and in finance, there has been far more improvement and advance during the last half century than there has been in agriculture. These occupations have been more completely systematized, have called to their aid a greater number of thoroughly disciplined minds. Unlike the management on the most of our farms, they are almost universally carried on with a complete system of book accounts, whereby may be understood the sources of profit and the occasions of loss. The laws that govern those various departments of business have long been the study of the most earnest and wisest of those connected therewith, and plans for very extensive coöperation among those of like pursuits and interest have been devised and carried out. Also vast improvements have been made in the machinery used in connection with manufacture and commerce, diminishing in a corresponding degree the cost of production and transportation. Consequently the per cent of profit upon capital invested in those pursuits has been far greater than upon that invested in agriculture, as statistics will show. And as a natural result those interests have come to assume a greater prominence in public estimation, and those connected therewith to exert a far greater influence according to their number in shaping the business and political relations and policy of our country than have the much more numerous class of farmers.

These and many other causes that might be referred to have had an influence to induce our young men, especially those who had enjoyed the best advantages for education, to abandon the farm, and to leave upon their minds the impression that other occupations and professions were not only less laborious and more lucrative, but also more honorable. Hence leaving this, which should be the noblest of all pursuits, as it is the most important, they have sought their life work in the overcrowded professions, or amidst the exciting competitions of more active business life.

Brother farmers, if there are evils in this regard to be corrected, if it is desira-

ble that our occupation should be raised to a more important, honorable, and influential position among the industries and professions of society, if we would see our fields wave with richer harvests, more easily and surely raised, and more cheaply gathered; our orchards saved from threatened destruction by disease, blight, and destroying insects, and laden with still greater abundance of more delicious fruits; our flocks and our herds steadily improving, not only becoming more beautiful and noble specimens of their kind, but returning a richer reward for better care more intelligently bestowed; our homes surrounded with greater evidences of thrift and prosperity, and also of culture, refinement and beauty,—*the work is ours*. The improvement must commence and be carried forward within our own ranks and *by ourselves*. The earnest and the active in all other occupations and professions, those who have any footprints along life's pathway, have all they can do in their own chosen life work. To that they give their thought and energy; so should we to ours.

While we would never fail to recognize the just importance of all other laudable pursuits, and respect the rights of those connected therewith, still there should be just so much of business coöperation and combination among farmers as a proper protection and furtherance of their interests require. This properly accomplished and wisely carried out, not *farmers alone*, but society at large, shall reap advantage therefrom.

But let us not get the idea that the advantages of coöperation among farmers are, or should be, confined to business arrangements alone. Our Agricultural College, and the Board and Faculty connected therewith, need our coöperation, our hearty sympathy, counsel, and support if we would make that institution exceed in usefulness our present most sanguine expectations.

In every township there should be some form of organization, either Farmers' Club, Grange, or something of the kind that would bring farmers together for mutual consultation and comparison of views and experience, and where by united effort agricultural libraries could be gathered, lectures given, and discussions held upon questions connected with our interests as farmers. For however important coöperation may be in connection with our business relations with society, it is vastly more important and necessary in connection with the true education of the farmer in all that will ennoble him in manhood and give him a thorough knowledge of those intricate laws of nature by obedience to which we as agriculturists are to achieve greater success, if it is achieved at all.

In no question connected with the affairs of this life is the world more interested than in the *cheap production of abundance* of food and clothing, all the raw material of which comes from the soil. And if "he who makes two blades of grass grow where but one grew before is a benefactor of his race," what would be the benefaction if, perhaps with little or no more labor of the hands, but with more of the brain, with the exercise of more knowledge and skill, the farms of Michigan alone should be made to produce two and a half millions of tons of hay, instead of a little less than one and a quarter millions, as shown by the last census; instead of an average of thirteen and a fraction bushels of wheat to the acre, and thirty-two bushels of corn, those amounts should be, as no doubt they might, doubled or trebled? And if from our flocks, instead of a yield of about seven and a quarter millions of pounds of wool, there could be shorn ten millions of better quality without an increase of their number.

There is much to encourage us; the work is begun. We may safely say that more improvements in labor-saving farm machinery, in stock of all kinds, and more advancement in the general style and science of agriculture, has been made

within the past twenty years than in the half century preceding; we have here and there a farmers' club; county district, and State agricultural societies with their fairs are very generally organized; we have subordinate, State, and national granges; our Department of Agriculture at Washington; State Boards of Agriculture in many of the States, and in quite a number of the States Agricultural Colleges, to the appreciation and support of which the farmers of the country are coming forward as they have not heretofore, and in this State we have inaugurated Farmers' Institutes, the number of which we hope to see hereafter increased, and from which we expect great advantages to accrue.

With these few opening remarks, I have the honor and pleasure of introducing to this audience President Abbot, of the Michigan State Agricultural College, who will now address you.

Secretary R. G. Baird gave an address on the "Farmer's Home." See lectures and addresses at the close of this record of the Institutes.

After an essay on "Farm Buildings" by E. C. Warner, the manuscript of which has not been furnished us, Mr. Burke Spencer read the following paper on

"THE APPLICATION OF KNOWLEDGE."

That the pursuit of agriculture was originally intended by our creator as the principal pursuit of man needs no argument of mine to establish. That the material wealth of the world lies hidden in the bosom of the earth, and that the farmer is the humble instrument in calling it forth and presenting it in useful forms to his fellow men, is equally plain.

A class of men to whom is committed so important a work as the feeding and clothing of earth's countless thousands ought to have every advantage that skill, science, and learning can bestow. In a country like ours, where large educational advantages are presented to all; and the farmers usually being the proprietors of the estates upon which they labor, they ought to be the most intelligent, prosperous, and happy people upon earth. Yet we have reason to believe there are instances where this is not the case. A business may present the largest inducements and pay the largest profits to intelligent and experienced workmen where ignorant and bad managers would signally fail. Since slave labor has been abolished and the genial influences of our agricultural schools and colleges are being felt throughout our land, agriculture has become highly respectable, and at the same time is considered a healthy and profitable pursuit.

The opinion once prevailed to some extent that a son who was expected to follow the pursuit of agriculture required but a very limited education. If he could read, write, add, multiply, and subtract, it was thought to be a large investment in knowledge and amply sufficient for his future occupation. We think these limited views very erroneous. We believe we should educate a young man as thoroughly for his profession as a farmer as we would for the bar or any of the so-called learned professions. And young men thus educated, disciplined and prepared for their business will rank in usefulness, intelligence, and ability with those of any other pursuit.

As there may be some difference of opinion in regard to what studies are really necessary for a youth that expects to be a farmer, we will say in the first place he should have a good English education, in order that he may express his views clearly and concisely, and in such a manner that it would be impossible for any one to attach any other meaning to his language than that which he intends to convey. Then the knowledge he may gain he can impart to others.

in a clear and intelligent manner. He should also be a good geologist and a good chemist. The former will enable him when he examines his soil to know of what it is composed, and what crops it is best adapted to raise. The latter science will enable him to select his manures with judgment, and apply them with skill; to know at what time his compost and manures are in the best condition to supply the wants of his plants, and it also gives him a knowledge of what crops he can raise to the greatest advantage, and consequently how to obtain the largest reward for his labor. It would also be a valuable acquisition if he were a good botanist, as this would add much to the pleasure of his pursuits. With a thorough knowledge of these studies the farmer, to a great extent, becomes a man of science, and as such, far more likely to succeed in many other of the walks of life.

We believe with our farmers thus prepared for usefulness we would soon see a great difference in their manner of farming, and a corresponding difference in their profits. We believe there would be a gradual and constant increase of their profits as compared with their expenses and investments, and their labors would be far more satisfactory to themselves. There would be more system and method in their business; their purposes, objects and aims would be higher, and inevitably result in higher attainments and greater success, for he whose object and standard of excellence is high (like the archer who aimed at the sun) may not quite reach the objective point, but he will be likely to attain to a far greater degree of success than he who aims at an object below or on a level with himself.

His objects and purposes should be well defined in his own mind, and it is of great importance that his ideal of imitation should be faultless, for in proportion as it is defective, just in that proportion will his labors fail of success.

With men of this character in the field, the system of farming known as the skimming system, or perhaps more properly the sinking system, would soon disappear,—a system that sooner or later reduces land to a degree of sterility that it will no longer pay for cultivating. I have in my mind a farm that fifteen years ago was one of the most productive and best managed farms in Wash-tenaw county, and by the practice of that pernicious system has reduced its present owner to a degree of poverty that is hardly to be believed. This man advised his neighbor not to plow under a large growth of clover, as it would be likely to sour his land.

Adjoining the above mentioned farm is another of about equal quality of land that fifteen years ago hardly paid for cultivation, but by its passing into the hands of an intelligent and industrious proprietor it has been raised to a high state of cultivation, and pays as liberally for the labor bestowed as any farm with which I am acquainted. This is a practical illustration of the *truth* that intelligence and industry will grow rich where *ignorance* and *idleness* will *starve*.

When we as farmers shall have a more just appreciation of the importance of our calling,—the amount of work that is expected at our hands; that we have the earth to subdue and the human family to support,, we shall then see the necessity and importance of calling every auxiliary to our assistance, whether it be science, labor, practical experience, the mechanic arts, or all combined. It is sometimes said that farming is overdone, but what Daniel Webster said of his profession is also true of ours: "There is always *room up stairs*." First class farmers can always find employment that will give a profitable return.

A great hindrance to progressive farming has been that many of our best and most successful farmers never write or say anything upon the subject of agriculture. I have a gentleman now in my mind who is one of the most extensive and successful farmers of Washtenaw county. I had the pleasure of meeting him just before our Institute last year. I invited him to attend and take a part. His reply was, he feared he could be of no use to his brother farmers, as he never said anything in public. About a year ago I had the pleasure of visiting his farm and spending the day with the gentlemanly proprietor in looking over his stock, farm, buildings, and his various appliances for the saving of labor. His residence, cisterns, wells, and even his tenant houses, were constructed largely with reference to convenience and the laws of health. His other buildings were mostly constructed upon scientific principles, with all the modern improvements and appliances. His agricultural implements were all nicely stowed away for winter; and by a simple application of a mechanical power, his heavy wagon racks were taken from and readjusted upon the wagons by one man with greater ease than four could do it in the ordinary way. I also had the pleasure of looking over his farm journal and other books connected with his pursuit, and I think that this gentleman is better prepared to give the public the exact cost of producing a pound of wool, pork, beef, or a bushel of grain than any one with whom I am acquainted. I also think that his experience and experiments in preserving fence posts from decay would be of great benefit to farmers. If such men would present to the public the result of their many valuable experiments, it would do much to advance our agricultural science.

When the importance of a more thorough system of underdrainage is better understood, appreciated, and practiced among our farmers, many of the swamps and unsightly *waste* places that we often meet with will disappear, and in the place of the weeds and wild grass that once luxuriantly grew will stand the golden grain waiting for the sickle of the master that made the change.

Thousands of acres of land that is now comparatively useless might be reclaimed to cultivation, and the health and consequent happiness of the people be greatly improved, and the material wealth of the State increased. In the performance of this important work, system, science, and mathematical knowledge, as well as labor, will be greatly needed. And as all our wealth comes directly or indirectly from our industry and the wisdom with which it is applied, it is important that we should realize the truth that there is no pursuit followed by man where a general intelligence as well as specific knowledge is of more importance than in the pursuit of agriculture. When this is generally understood, accepted, and appreciated, science and labor will go forth hand in hand over our pleasant plains and fertile valleys, and wealth and happiness will be our reward.

This session closed with a short and instructive discussion on the subjects of the essays.

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FORENOON SESSION.

After an opening piece of music by the band the following resolution was adopted :

Resolved, That following each paper read before the Institute a discussion not to exceed fifteen minutes shall be had, and that no one shall be allowed to speak more than five minutes during each discussion.

An excellent essay was read by Mr. Frank Gully on the "Raising of Swine." We have not the manuscript of this essay, but hope we may have it so as to appear with other addresses at the close of this record of the Institutes.

The following essay by Geo. W. Gill was read :

"THE PRESERVATION OF AN ORCHARD."

To the apple-growers, wherever they may be, my remarks are particularly addressed. Whether they agree with my far older and more experienced brother farmers or not, I cannot help. And what theories I have to offer, unless they are sound and based on correct principles, I would have none of you follow them. But if my remarks shall arouse an interest in this important subject I shall be abundantly repaid. If we never talk or otherwise interest ourselves in particular subjects, we are very apt to follow in the same ruts that our fathers and grandfathers did, and our chances for improvement are very limited. Farmers, how very few of us realize how much such a gathering as this is worth to us. Think, if but for one moment, of the benefits we may gather from a meeting of this kind. Many of us meet here as strangers; we part as acquaintances and friends.

This feature alone, in my opinion, will amply repay us for our trouble. In drawing your attention to the subject I have chosen, perhaps it would be well to say for myself that I have always received much pleasure from habits of observation. It seems to me I always get my full share of the good things at any public gathering, for if the speaker or his subject fails to interest me, I can always turn to the audience and find plenty of subjects which will both interest and amuse me. Take the largest gathering any of us ever attended, even the vast numbers at the Centennial, and no two persons alike; every one different; no two with the same cares, the same troubles, or the same looks, and all with their habits and nationality more or less stamped on their features, all showing nature's laws to be unchangable. Yea, men or women, animals, plants, or trees, must observe her laws or pay the penalty. And this brings me to my subject, Preservation of Orchards. I have no doubt you will all agree with me that if we knew nature's laws in regard to the growth of trees, and would observe them, we should have healthy trees. But it is in not understanding these laws; or in not applying them, wherein we fail. In the first place, is it right to dig the tree up, take its main root, sever it in two or three pieces, and start a tree from each piece. Now, I think you will all agree that the tree never has the same form of roots that it would have had; or, in other words, it never has a large, strong tap root as it has in a state of nature. Now, we know that the tree, in order to grow, has a variety of duties to perform. As the sap rises and is exposed to the action of the air through the leaves, it is then fitted in a condition to be used by the tree in the formation of new wood, new buds, blossoms, fruit, etc., in the formation of wood the tree makes use of a variety of minerals which it takes up from the earth, and I believe that the tap root has an essen-

tial duty to perform, running as it does straight down (or nearly so), and that the life and health of the tree depend in a great measure on its being started as nature designed it. I have observed of late that a number of farmers from this or some other reason have set out orchards with natural fruit trees, and in my opinion it is the only correct way of doing. Please bear in mind what I have said in regard to destroying in a great measure the tap root or roots that run deepest. What is the next thing that is generally practiced? It is that of plowing, and this is generally done by hired men, who care no more for the trees than for so many oak stumps, and if they did their orders are to plough as close as possible, even if they do bark them a little, they will get over it. I would say to such men if they got their shins barked from knee to ankle, oh, it is nothing, you will get over it in time; but it is not the barking that I wish to draw your attention to at this time; it is the destroying all the surface roots, without which I think the tree suffers far worse than from the mutilation of its lower roots. I believe whole orchards are ruined by this one thing. Just think of tearing up the ground to the depth of six, eight or ten inches around a tree once or twice a year. It is a wonder to me that the poor tree does not die at once under such treatment. But it is with trees as with animated beings, they seem to have a dread of death, and thus we see them struggle on with scarcely a limb on them to tell us they are yet alive. Farmers, what is your next step to your already crippled trees? Is it not pruning, or would it not come nearer the truth to call it cutting and slashing, for does not our hired man again come into play? Is it not Thomas I must have my orchard trimmed? Take the saw and ax (I have had it sharpened on purpose) and give it a real good trimming. Away goes Thomas for the orchard and up into the trees with his heavy stoga boots on, cutting limbs from one to three inches in diameter, pushing and pulling, loosening the bark on every limb he stands on, for bear in mind it is universally done in the spring of the year when the sap is in full flow, when it takes but very little to do untold damage in this way. Please think of the tree with roots crippled bottom and top, and now bleeding from fifteen to twenty different places throughout its top, besides the bark being loosened in very many places by those monstrous coarse boots. No doubt some of you begin to wonder how a tree lives at all, but do not think I am done yet.

What is our method of gathering our fruit? Do we not again send men into our trees to pick the fruit? And the consequence is breaking many limbs and injuring others that they stand on, for in the majority of cases the foot is placed between two limbs, so that there is nothing but the wedging of the foot to sustain the weight, and in such places loosening the bark is inevitable; it cannot be avoided. Then, again, how is the fruit on many of our early apple trees obtained? Have not many of us seen our men when wanting an apple hurl clubs or sticks three or four feet long into the top of a beautiful tree, and repeat it many times, and we take very little or no notice of it. These, my brother farmers, are some of the abuses our orchards have to bear. Is it any wonder that many of them die before they fairly commence bearing? A few more words, on what I believe to be the correct manner of planting, and using an orchard, and I will close. In the first place it would be best to manure your ground very heavily the year before planting your trees. Also keep the ground thoroughly cultivated during the season by raising some crop that will allow you to do so, then setting out natural fruit trees and grafting afterwards when nicely started. I find by experience that it is a good plan to put saw dust or straw around the tree in order to keep the ground moist, as I believe many

trees are lost during the first season by neglecting them in this particular. Next I would allow no man to disturb the ground near the tree. The best rule for this is to imagine a perpendicular line drawn from the tips of the outside branches of the tree to the ground and not allow the ground to be disturbed inside of this limit on no account, but to spread some straw or sawdust once a year or once in two years around your trees, which will effectually keep down the grass and weeds, and furnish the roots of your trees with just the covering they need. Next comes the subject of pruning. This to me is far the most difficult part of my subject to give advice upon. I sometimes doubt whether there is really any benefit derived from it; at any rate I would advise moderation, never cutting any large limbs unless dead, but taking what is called suckers, pinching buds, or cutting small twigs. I also think it best to defer the main part of pruning until November, or just after fruit gathering, as the tree loses far less sap and consequently suffers far less. In gathering fruit I would pick entirely from ladders, allowing no one, unless a small boy, to go into the top of the trees.

One idea more and I close. It is this: None of us seem to realize that a plant or a tree has such a thing as life; that they suffer from neglect and abuse in the same manner as our animals do, only they bear it in silence, and we pass by indifferent. But, my friends, let us look at this subject a moment; let us take a kernel of corn; we see nothing in particular about it; at the same time we know it contains a germ, and we know that by obeying certain laws, which we have found out are necessary, it will grow and produce a beautiful stalk, and just in proportion as we satisfy its wants, just in that proportion will we have a perfect, healthy plant capable of producing numbers of kernels in perfection. The same may be said in regard to trees. Now, how much will we have to change these remarks to make them apply to animals. Please ask my friend Mr. Uhl if he can raise a perfect ox, cow, or horse and disregard their natural wants. Ask him if he should go through his yard some morning and find his hired man with a club four or five feet long pounding his best cow or horse. Do you think he would pass by in silence? Do you think under such treatment he could show such perfection in cattle as he can to-day? But you say the apple tree must stand all this and still be perfect. All I can say, then, you will never have perfect trees.

Now, my hearers, you have my ideas on the treatment of orchards. If in your judgment I have told you truths, if the laws of nature and the habits of tree life will bear me out in my theories, then, for your own profit and in behalf of our suffering orchards, I trust you will endeavor to think oftener and give more care to this much abused and neglected industry.

DISCUSSION.

Mr. J. A. Scott.—Being a practical fruit grower, I have been much interested in the essay just read. I believe in growing natural stocks and grafting in the top. I am opposed to root grafting. It is a process that will never give healthy trees.

I fully agree with the essayist in regard to mulching and not disturbing the roots by plowing. I believe many orchards are injured by too much manuring. Fruit trees do not require much manure till they come to bear. Afterwards they should have frequent top-dressing. I consider leached ashes valuable for this purpose. I prune very lightly twice each year. If you want to increase the growth of fruit prune when the sap is flowing; if to promote the growth

of wood prune in winter. I would not prune as the English do, cutting out the center of the top to let in the sunlight. In this country a tree may have too much sun.

Mr. J. B. Lord.—Do you graft in the limbs?

Mr. Scott.—That depends on the stock. Sometimes I splice graft on the limbs, and sometimes bud on the stalk.

Mr. Lord.—Do you consider leached ashes better than unleached?

Mr. Scott.—I do, because you can put on a thick covering to prevent the growth of grass and weeds. I use straw on clay soil, removing it in winter on account of the mice. The ground should be clean around the trees in winter.

Mr. Stanley.—At what time of the year do you prefer to plant?

Mr. Scott.—I always succeed best with spring planting. Fall planting may succeed in sandy soil, but in clay plant invariably in the spring.

I plant apple trees forty feet between the rows, with a row of peach trees or dwarf pears between. I do not plant the apple trees in the adjacent rows opposite each other, but diagonally.

Mr. Stanley.—At what age do you prefer to plant trees?

Mr. Scott.—I prefer trees two years old. With such trees you get a more natural root, and they grow better.

The following paper was read by Mr. W. E. H. Sober, on

DAIRYING AND ITS PROFITS.

Can dairying be made profitable in this county? The question of profit is one that decides a man in all his business undertakings. The question next in the line of this examination of an undertaking, and the one that has the most weight, is, will it pay as well, or better than something else? Man seeks to insure to himself in the matter of profit his possible best, and as between two kinds of business he will select that which promises the best profit.

It is hardly necessary to say to this audience that the cow is the source of the dairy. I suppose it is understood by the term dairying to include all the methods of handling milk so as to present it and its products in merchantable condition as food. Milk and its products are found on the table of almost every American home. Butter, cheese, and condensed milk are exported in large quantities, making these products a matter of importance to the farmer.

Washtenaw county, though high and rolling and best adapted to the production of grain, is not deficient in elements to produce fair growths of grasses, rich and nourishing to stock, as the large and fine herds and flocks it maintains well attest. Grain has been, and is to-day, the leading product of this county. But I think the feeling among our best farmers is growing stronger year by year that mixed husbandry is safer, and more profitable, all things considered, than special. They are coming to see more and more as the years go by that their acres do not return them their twenty, thirty, and forty bushels of wheat, as they did when the soil was new and rich in the elements of wheat food. They observe the new vigor of those fields when a plentiful application of barnyard manure has been made, and they are asking with an earnestness that gives promise to the future of farming in this county, "To what stock can we feed the hay, coarse fodder, corn, oats, and roots so as to return as good a profit as when sold in the town markets, and leave the manure on the farm as an offset for the labor of feeding and care of the stock. This question once settled in the minds of farmers that these products can be profitably marketed by being transformed into beef, pork, mutton, poultry, wool, milk, butter, cheese, and the growing of

fine stock on the farm; they are prepared to take a step forward in improved husbandry, for then commences the husbanding of the resources of the fertility of their acres.

The question of profit on the farm is not absolute; it is but comparative or hypothetical. The farmer as a producer is a manufacturer, and is perforce subject to the ups and downs of the market. He, like any other manufacturer, has something of a range of products he may select from to produce, and his success or failure may turn on what some would call small things. But he must have, to secure success in these days of sharp competition, facilities for production and a market for his products. Has he in this county these prime conditions?

Although not ranking first as a grass producing county, it by no means ranks low in this particular, and to-day, as I have said, it feeds a large stock of horses, cattle, sheep, and swine. All these kinds of stock do well when properly cared for. As to market facilities, it stands unquestioned.

I know of no good reason why dairying should not be made profitable in this county. Good cows are bred. They produce good milk, and in good quantity. Good butter and cheese are made from it. There is a good market for it. Milk and its products are staple articles of food in all the markets of the world. Just now the question of coöperation among farmers in farming is much thought of, and to some extent entered into.

I think this whole question of dairying is one in which farmers in this county could with profit coöperate. Grain is, and is likely to be, the leading production of the farms in this county, because the soil is natural to that line of farming, and for the further reason the impression is yet general among farmers that as between the profits of a given field of good arable soil, as to stocking it or cropping it, it is in favor of cropping. But to crop it continuously with profit, barnyard or commercial manures must be liberally applied. Hence we have this conservative feeling among us, we will raise some grain and raise some grass, and raise and feed some stock, and so rest our fields from the constant drain of producing one or more cereal crops which feed upon only a few of the elements of the soil.

What kinds of stock to keep or raise on the farm, is a question as important as that of what kinds of grain. Here comes the point where we may choose what we will produce or manufacture, and there is something of a range. I believe it is always safe to manufacture any article that is in general use and consumptive demand, if one's facilities are such as to enable him to furnish it equal in quality, and as cheaply as any one else. What one would like to do, and what he had better do, are questions of prime importance for him to settle at the outset, especially if his likes are for a business his locality puts him at a disadvantage with his competitors.

Sheep are stock I like to keep. They are peaceable and need less care than cows. Their wool and meat are articles of general consumption, and will continue in increasing demand. Why not follow your likes, then? Because, taking things as they stand to-day, the southwestern portion of the United States, Mexico, South America, Australia, and Africa are producing wool cheaper than I can produce it. The keep of their sheep is nominally the cost of a few men to watch and protect thousands of sheep in a flock. Those sections support no schools, build no churches, and pay light or no taxes. If wheat at two to three cents a pound in market seeks that market at a profit, grown thousands of

miles distant, what impediment does distance interpose to a product like wool, worth in market twenty to fifty cents per pound? Taking the price of land and labor in Washtenaw county as compared with those above named, were enough of the wool of the world's consumption is produced to fix the price of ours, we raise it at a loss. Milk, butter, cheese, and beef are as well articles of general and indispensable use. Farmers would not think of keeping house without some of these products of the cow. Marketable butter, cheese, and condensed milk are productions requiring specific skill, and the use of improved methods and machinery to produce. Hence there ought not to be danger of successful competition with us in this business by barbarians, or on land worth much less than ours. Here seems to be an opening for coöperation among farmers. If there is a greater profit in manufacturing or changing the form or quality of a raw product so as to make it more merchantable and therefore create a larger market over the production of that raw product, here is a department in farming where the farmer may secure both. On small farms, under this system of mixed farming, it is not possible to keep many cows; but no farm is so small as not to keep one or more. And here comes in the proper work of association or the factory system of making butter, or cheese, or condensing milk. No one farmer needs to be at the expense of a suitable building, putting in needed machinery, and furnishing skilled labor to manufacture the milk from his own cows alone. It may be jointly owned by a neighborhood. Under this system the best possible results may be worked out for this department of farming. It offers the means of making the best possible quality of goods at the least possible cost. It provides a way for relieving the wife of a heavy burden, and goes far in removing the vexed question of keeping a hired girl. In fact, the making of butter and cheese from the milk of two to eight cows in the farm house is in keeping with the practice and times when the itinerate shoemaker was called in every fall to make up the winter's supply of shoes for the family. Farmers must seek the cheapest methods of producing their goods or fall behind in the onward march of other industries which take up and utilize every improved method. Processes once profitable have been superseded by a better. Wide-awake men take up these and make a success of them. The practice of farmers in their business must be as intelligent and economic as the practice of tradesmen, if they would have their business equal the profits of the tradesmen.

And now how can I better show you that dairying in this country can be made profitable than by comparison. I will take the keeping of sheep, which is supposed to be a profitable stock to keep on the farm, as a standard of profit by which to measure the profit of the cow. I shall give you the results of the two kinds of stock handled on my farm in the year 1875 and allow the keep of ten sheep to equal the keep of one cow. I had that year fifty-three sheep.

They sheared 392 lbs. wool, which sold at 36 cts. per lb.....	\$141 12
“ raised 25 lambs estimated at \$3.00.....	75 00
<hr/>	
Giving as the returns of 53 sheep.....	\$216 12
Or for 10 sheep.....	40 74

Our cheese factory commenced making cheese the 3d of May and ran six months. I put into the factory on that day the milk from three cows. The 3d of June four more, and from that time on till the close of the season with seven. These three cows one month and seven cows five months gave 34,201

lbs. of milk, which netted $9\frac{1}{2}$ mills per pound as cheese.....	\$325 47
Raised three calves worth \$10 each.....	30 00

Making for seven cows 5 3-7 months..... \$355 07

Had the seven cows been in the whole season, six months, they would have given 37,801 lbs. of milk, which, at $9\frac{1}{2}$ mills per lb., the account would stand:

Milk of seven cows six months 37,801 lbs. at $9\frac{1}{2}$ mills.....	\$359 10
Three calves \$10 each.....	30 00

Total for seven cows six months.....	\$389 10
Or for one cow six months.....	55 58

The account stands, then, compared as that year's return of the two kinds of stock, like this: The product of ten sheep one year, \$40.74; the product of one cow for six months, \$55.58, with three months milking season yet to account for. Now, one month's average of these seven cows is \$8.55, and if the three months unaccounted for is only equal to one month in the factory, then the cow in this count would show for a year's gross earnings \$64.03, or a difference in favor of the cow over ten sheep of \$23.29.

Estimating 22 pounds of milk to make one pound of butter, the cows would have made in the six months 1,718 pounds of butter, and 20 cents per pound would have given \$49.08 per cow; and sold as milk at five cents per quart, \$127.05 per cow as gross earnings.

This look of the dairy business does not confine it to one particular line of product for profitable handling.

DISCUSSION.

Prof. Beal.—Do you not think it costs more to keep ten sheep than one cow?

Mr. Solon.—Probably it does; from seven to ten sheep are reckoned as equal to one cow.

Mr. Wing.—You can pasture sheep where you cannot pasture cows,—on summer fallows and new rough places, where they are really a benefit.

Mr. F. S. Finley.—I can keep two cows as easily as ten sheep.

Hon. J. J. Robinson.—If it is true that animals consume food in proportion to their weight, it would require ten very large sheep to eat as much as two cows.

Mr. D. M. Uhl.—It is not true that animals eat in proportion to their weight any more than that men do.

Mr. R. F. Johnstone gave an address on "The Profits of Different Breeds of Cattle for Beef and Dairying."

AFTERNOON SESSION.

After an opening piece of music by the band, Mr. John P. Finley gave the following address on

FARM FENCING.

The importance of judicious management in the operations of farm fencing

is not to be underrated. Wisdom in this direction will certainly advance the pecuniary welfare of the husbandman. The matter has received but little attention from the farmer, and its evils have been endured without a murmur seemingly, because, as is characteristic with him, whatever has been acquiesced in for years must be accepted whether or no. Due regard has not been paid the subject by agricultural writers. I dare say you cannot find an allusion to it in any of the Michigan reports. But surely a matter of so much importance, so intimately conjoined with the immediate welfare of the farmer should not be required to be bolstered up by the press before being embraced by the interest most closely concerned therein. Calculating the cost of fencing is the only way that we can arrive at improvements in its economy; but notwithstanding the statement of the cost is a very good argument, it has very little weight with farmers. It is said to have about the same effect upon their minds and their actions as the statement of the cost of using intoxicating liquors and tobacco has upon the toper and smoker. The trouble lies in the fact that the farmer is disposed to manifest the usual indifference which follows in the wake of any idea or plan that embodies in the least the spirit of revolution. Can it be that we are opposed to progressive change,—change for the better? Let us not hold ourselves liable to the charge of stupid conservatism. This indiscriminate aversion to innovation arises from habit. We continue in the old way, with no better argument for it than this: It is the way my father did, and he says his father always did so; and I guess if it was not right they would have found it out; this declaration ends all argument. It is a bold son that dares to do as his father never did. Yet in this matter of fencing he should have courage to shake off the shackles of precedent, and get out of the old hard path of our very respectable old-fashioned grandfathers.

I shall speak in the first place of the kinds of fences and their relative adaptation to the purposes of economy and durability, and finally of the expense of fences and how they may be dispensed with. Of the many kinds of fences in use some merit attention, and others are not worth the time spent in learning their construction. Among some of the various styles, we have the following: Common board fence, rail fence, wire fence, picket fence, hurdle fence, stone wall fence, and hedge fence. Fences are divided into two general classes: portable and permanent fence. The former is used for interior boundaries, and the latter for highway and division line fences. The common board fence belonging to the second class is the most desirable of all those mentioned, for several reasons. It takes up less ground, is more economical, is not a harbor for briars or vermin, makes the best appearance, and is not as liable to become frequently necessary for repairs, or, as farmers say, "out of kilter." If a board fence is built for a permanent one, the boards should be battened over every post and nailed with what are known as fence nails; and the posts, unless of the most durable kind, should be kyanized and always set in a position reverse from that of their growth. The process of kyanizing consists in filling the pores of the wood with a mineral substance, such as sulphate of copper, zinc, or iron, combined with water, in the proportion of twenty parts of the latter to one of the former. The power of this material as a preservative is conceded to be unequalled. Posts which have stood in the ground for ten years are found to be perfectly free from decay. Posts should be set top end down. The theory of this increased duration is, that moisture cannot ascend as readily when the order of growth is reversed, thereby preventing decay.

A writer in the *New England Farmer* who tried numerous experiments in

setting fence-posts by reversing, salting, and charring, is satisfied that charring did no good. Salting dry posts was beneficial, but upon green ones it was useless. The best thing was reversing the ends. Of the various kinds of timber of which posts are made red and yellow cedar rank the highest for durability, aside from the effects of any preserving process. Swamp oak, I think, is conceded to stand next in order, with upland white oak following. Rail fences are really more expensive than board fences, and unless staked and wired are almost continually in need of repair. They nourish all sorts of pestiferous weeds and bushes, which become in time ugly and deformed spots and detract decidedly from the thrifty appearance of the farm. If a farmer must build with rails, let him make the fence straight by setting upright stakes bound together by wire to hold the ends of the rails to place, otherwise the fence will employ nearly twice as much ground. A zigzag rail fence, called by some so charmingly picturesque (perhaps on account of the briers, hazel bushes, and stone piles encompassing it), takes up a strip of land four or five feet wide, and if staked and ridged about two feet, thereby obtaining from every 100 acres fully five acres of land, or 500,000 acres of the fenced lands of this State which are rendered worse than useless. What farmer would willingly endure a government five per cent. tax upon the value of his land? Yet this is just what he voluntarily inflicts upon himself in thus losing the use of land besides the cost of the fence. Wire fencing is receiving some attention from farmers at the present day, but as yet it is an open question whether it is practically useful.

It can be built cheaper than ordinary board fence, as the following comparison will testify: One mile of board fence, made of six inch boards, and with posts eight feet apart, will cost \$219.84, while the same length of wire fence, built of No. 9 wire not annealed, and with one six-inch board for the bottom, will cost \$160.76, a difference in favor of the wire fence of \$59.08. The posts supporting the wire should be set not more than seven feet apart, and very deep, bracing them with strong timbers resting against short posts set in the ground for the purpose, as the tension of the wires makes the whole strength of the fence, and it is almost impossible to set posts that will not yield to the constant strain. An Illinois farmer says his fence of No. 7 for the upper wire, No. 8 for the second wire, and No. 9 for the two lower wires, built in stretches of forty rods, costs seventy cents per rod, and proved effectual. But as a general thing fencing with wire has not proved a success. If made cheap it is not effectual, and if made effectual it is not economical. Many farmers are now at great expense preparing or putting out hedges of osage orange, which will in time prove to them a most vexatious burden. The principal objections to this plant are that it grows too vigorously, and is a most greedily absorber of all the nutriment in the soil within reach of its long roots. Nothing goes through it, and it is equally true that nothing will grow near it. There are quite a variety of plants used for the purpose of hedges, but the two leading ones are osage orange and thorn. As a general rule, any plant that naturally grows to a tree makes a poor hedge plant. For the purpose of a hedge, there is no evergreen at the north equal to the arbor vite. It is very hardy, and limbs grow thickly from the ground twenty feet high, if desired. It is of slow growth, and does not naturally grow to a large tree, flourishing in almost any kind of soil, if not too dry.

Concerning the different varieties of fence of which I have spoken, some are relatively more serviceable than others, but none are indispensably necessary to profitable farming. It may be requisite for the present that highway fences

should remain, waiting their disappearance for legislative assistance and the acquaintance in general of the farmers of the fruits to arise from this beneficial change. But as to interior fences, if we must have them, would it not be better to use portable ones? Would they not be more economical? Each farmer would have just what fences he needed, and no more. The disposition of them could be rendered easy and practical. If not required for any purpose during the year, they may be easily placed under shelter and preserved. Portable fence can be constructed by any farm hand in winter, or at such times as out-door work could not be carried on conveniently. If made of sound materials, and not placed in contact with the ground, it will last for twenty-five years. But even with portable fence you incur an expense of time, labor, and money for which you receive no adequate return. Fencing burdens the farmer with an outrageous tax, arrange it as you will. Why not adopt the soiling system, which avoids fences and realizes a great saving in money and crops? Now let us see if by the means of a few statistics we cannot in some measure realize the oppression we are suffering in the way of fencing. Notwithstanding our apparent unconcern regarding the most forcible argument against fencing,—its cost,—yet it seems to me that no one can reflect upon these facts without feeling that they accord more or less with the experience of most farmers. Those who have never considered the subject can hardly believe the facts; such, for instance, as that published by Nicholas Biddle, made from careful estimates, that the fence tax of Pennsylvania is \$10,000,000 a year; or that of Mr. Pell, that the farm fences of the United States cost \$1,350,000,000, and that the annual charge upon farms to maintain fences is equal to \$250,000,000 per annum. These are startling statements, but who can show that they are not facts. They are at least worthy of consideration by all farmers. The Hon. Joseph Blunt, who has devoted assiduous attention to the question of improvements in farming, estimated that the cost of fences in the State of New York in 1859 was \$67,500,000. Interest and annual repairs may be reasonably calculated on the cost at ten per cent., which makes \$6,700,000, and dividing the cost of renewal through ten years, the average lifetime of fences, makes a like sum, and gives an annual cost for fencing the State of \$13,400,000. But remember that the date of this estimate is 1859; and now, with an interval of eighteen years crowded with vast improvements and the addition of numberless acres to the cultivated belt, the actual cost would reach \$200,000,000, and the interest and annual repairs to something like \$20,000,000. Now let us glance a moment at the alarming cost of road fences in the same State. It is assumed that the average is one mile of road to each mile square of land, and upon this as a basis of computation, there are 56,000 miles of road-side fences, costing \$17,920,000, and the annual cost for repairs and interest is estimated at \$3,124,800. Looking at the facts in our own State, we find a proportionate burden. According to the State census of 1874, there were 113,413 farms, containing 10,213,692 acres, averaging 90 acres each. Estimating the average number of rods of fencing on farms of that size to be 800 rods, and the cost per rod \$1, the total cost of the fencing on 113,413 farms would be \$90,730,400; and calculating the interest and annual repairs at ten per cent. of the cost, we have 9,073,040. Dividing the cost of renewal through ten years makes a like sum, and gives an annual cost for fencing the farms of this State of \$18,146,080. The annual charge upon each farm, estimating them to average 90 acres, is \$56; and it requires the interest of an equal sum to keep the fences in repair, making in all \$80 as the average annual amount expended upon each farm. The

annual fence tax upon all the cultivated lands of the State is \$1.77 per acre, while all the State, county, and local taxes of the rural portion of the State are only about \$.35 per acre. There are 32,000 miles of roadside fences in the State, the estimated cost of which is \$10,240,000, and the annual cost of repairs and interest \$1,024,000. In Washtenaw county, according to the State census of 1874, there are 269,715 acres of improved land, the cost of fencing which is estimated at \$2,157,720. To fence a township costs \$216,000; and if estimated upon this basis, which is supposing all the lands of the town under cultivation, the cost of the fences of the county would aggregate the enormous sum of \$4,320,000. Is this vast expenditure necessary? Just look at the figures, reaching even into the billions. Will farmers enquire whether nine-tenths of it could not be dispensed with most advantageously, doing without many other items of cost which are incidental to the present system? We blow loud and lustily our trumpets about the financial benefits of coöperative societies and a trans-continental coöperative bugbear, which in our vainglory we anticipate will revolutionize the laws of trade and place the coffers of the world at our disposal. To be sure we have cause to feel solicitous about the practical economy of our business as now conducted. We realize that our expenses are burdensome, our returns deficient, our profits dribbling away from some cause we do not seem to understand, simply because we dwell too self-complacent with our own management. We say the fault is not at our own doors; there is nothing that we need to reorganize and improve in the usual manner of conducting our own affairs; the danger apprehended must result from the antagonistic interests of other occupations. But how is it; have we reached the highest stage of perfection in our work? I think you will all bear me out in saying that much yet remains to be done. Two of the greatest hindrances to profitable husbandry are an insufferable fence tax and superficial culture. Our fence system has been gradually engrafted upon us by accidental circumstances growing out of the necessity of early settlers who fenced around the first cleared field and let the stock run in the woods. Laws made at first to protect such settlers have been continued, and men educated to bear the heavy burden they entailed until they appear to love the law, or rather custom that forces them to pay such a penalty. The universal custom, and not the law,—for really there is no such statute,—has led men to believe that every owner of land is obliged to fence all the world out; and that it is not trespass to enter upon any unenclosed lot and despoil it of half its value. Were it not for this unjustifiable custom, a poor man might go out upon the western prairies, and without a dollar of capital take up public land, hire the culture performed, the expense to be defrayed by the crop or his own labor, and in a few years become the owner of a good farm. But he is denied this enviable position because custom compels him to first fence his fields and plant them afterwards. Statute laws do not require land owners to fence highways. It is the law of custom,—a custom that has been so long in use that most people suppose it to be a law. The whole system is founded upon error. The law, of course, will protect property. It never takes it from one owner to give it to another, as if it should authorize the pasturing of one man's cattle upon another's land. The owner of land along a highway owns all but the right of the public to use it as a thoroughfare. No law can constitutionally give any other man the right to mow or pasture the grass in a highway, nor compel the owner to fence out the cattle of others. It is not law by the enactments of any Legislature, and it has been frequently decided by courts in different states that the owner of land can recover damages for trespass, fence or no fence. Says a noted

agricultural writer, "We can conceive but one greater nuisance in a neighborhood than a hog that is always on the watch for an open gate or hole where he can thrust in his nose and root away into mischief, and that one greater nuisance is its owner. An owner who educates his animals to steal ought to be held responsible as a thief, and the animals got rid of. Domestic animals should be made more domestic. It is the best way to save expense in fencing. In no other country is the fence tax so onerous as this. Throughout France there are very few fences. In Belgium fewer, and in Lombardy and northern Italy they are scarcely known. We are beginning to realize in some sense the heavy penalty attaching to numerous fences, as examples will testify. In southern Illinois farmers are doing away with them; and some of our own towns, as Battle Creek, are abandoning them to their benefited appearance.

These examples seem to testify that fences are not an absolute necessity. I clip a few well-timed sentences from the remarks of an agricultural writer in California upon fencing: "The trespass law, better known as the 'no fence law,' has on the whole worked well. The principle is right, and its application cannot be wrong in any part, except to be made more effective, and its application more general." Where agriculture has been carried to a high state of perfection very few fences are seen. A few monuments are set up to define boundaries, but there are no division fences and no waste land on that account. It is clean land and clean farming. The time will come when the best farmers in California will have few division fences. Movable ones will be adopted where temporary divisions of the field may be necessary. But I presume the question arises in your mind, how can I dispense with fences? I recognize their immense cost, but how am I to pasture my stock without enclosures? I reply, adopt the soiling system, which will avoid interior fences, saving land as well as fence; saving manure as well as time in always having working animals and cows at hand. It makes animals more docile, benefiting the morals of farmers' boys, which are apt to partake of the character of the animals; and wild animals make wild men, and trespassing animals make bad neighbors and breed mischief. Order and gentleness among animals and men grow out of this greater domestication under the soiling system. There are nine leading and distinct advantages in favor of soiling enumerated by writers upon the subject, to-wit: saving land; saving fencing; saving food; keeping stock in greater comfort, good health, and better general condition; producing more milk; saving the manure by which greater cultivated crops are produced; the animals are more docile and easier disciplined; they commit no trespass, as animals at large frequently do, and the business of the farm can be conducted in greater order and comfort, and altogether more economically. Are not these advantages plain, desirable, and sufficiently important to convince anyone of the benefits of this system. It is not necessary that a man should carry on the business of a dairy, or possess for any purpose a large stock of cattle and horses, in order that the practice of the soiling system should be rendered profitable, for it is not the number of animals to be cared for, but the evils avoided and the good received that constitute the work of the system. The waste of land by fencing is enough of itself to condemn the practice if there were no other expense. What it costs and what the law is, and not what has been customary in regard to fences, should be matters of constant thought and frequent discussion in all farmers' club meetings. In farming, as in other kinds of business, we are laboring for the profits, and if that be the case, we must not allow ourselves to pursue a course which endangers our advancement, and go on simply from force of habit. Let us in the pur-

suit of our noble calling incorporate some, if not all of the excellent ideas embodied in the remarks of Mr. Mitchell, of Connecticut, on fences, to-wit: "Lay out your land for the easiest and most economical working; give no land to permanent pasture, which will pay better by tillage; make access to every field easy; order your homestead and its surroundings so that your children will love it and hate to leave it; abandon fences as fast as you can; watch your State Legislature and see that it aids you, and when the barriers are down and the great tax lifted, learn to trust your neighbor and so to live that he may trust you."

DISCUSSION.

Prof. Beal.—Has any one present had any experience in the use of barbed wire for fencing?

No answer.

Mr. J. A. Scott.—This is an important subject and at present we must have fences of some sort. I have made a good fence with posts ten feet apart, spiking split oak bars to the posts. It is strong and durable; is much in use in Ohio.

Prof. Beal next read a paper on "The Apple Orchard." See lectures and addresses as above.

The following essay was read by Miss Jennie M. Chatterton:

"FARMERS' HOMES."

The vexed question of the comparative advantages of town and country life is one that will never be decided. With many the opinion prevails that if, as is so often asserted, "God made the country and man made the town," then the former portion of the earth's surface was created for the exclusive benefit of country men; and without much inquiry into the extent of its resources, they are quite willing to leave the latter in full possession of their heritage.

To some, also, the country appears a sort of arcadia of smoothly shaven lawns, tasteful residences, and fruits and flowers unlimited, where the waters teem with fish, the woods with game, and one has nothing to do but live and enjoy the good the gods provide. Others, still, enlightened by glimpses during occasional brief sojourns of the under side of farm life, which,—so curiously are things turned,—is sometimes the outside, are ready to go to the opposite extreme and declare that to the highest degree of all occupations farming combines the maximum of hard and constant drudgery with the minimum of relaxation and enjoyment. An external source of these various opinions may possibly be found in a certain old proverb: "A man is known by the house he lives in and by the hat he wears."

Oracular wisdom of this sort, illiberal though it may seem, is conceded to be pretty strongly grounded on fact. It is doubtless a surprise to the good American citizen, fond of quoting with sonorous emphasis,

"The rank is but the guinea's stamp,
A man's a man for a' that,"

when he finds himself bowing with an extra shade of obsequiousness to some local millionaire, the owner of a mansion corresponding to his fortune; or involuntarily setting some shining light of literature considerably lower than the angels after an injudiciously honest biographer has revealed the wretchedness of his furnished lodgings and the importunity of his creditors; and the

fact may trouble him a little until he determines to forget it, in common with many other puzzling developments of human nature.

We find by observation that farm houses may be divided into three classes, the ambitious, the comfortable, and the indifferent. These, like the hues of the rainbow, are so very apt to run together that it is exceedingly difficult to determine where one ends and the next begins. The ambitious house is generally built substantially after the prevailing fashion of the time, and as it is built so it remains for many decades, being, like garments constructed in the same way, rather difficult to make over. At first it was accustomed to take unto itself the form of a square or oblong structure of stone, brick, or wood, in the latter case invariably painted white, with green blinds, standing near the high road, with only a narrow yard intervening.

Shade trees were accounted neither useful nor ornamental in those days, and therefore were wanting, and the only flowers were supplied by a few straggling rose bushes and lilac trees which were permitted to run a race for life around the narrow enclosure. Later the classic style came into vogue, it being the fancy of the rural Socrates of that era to retire from his daily labor to a dark and dingy apartment in the rear of a palace of painted pine pillars, modeled after the Parthenon, where Xantippe, his wife, as she wearily prepared his evening meal, had much excuse for indulging in a temper worthy of her name. Little mattered it to him that its walls were destitute of ornaments, its windows of shade, that an army of flies as numerous as the locusts of Egypt swarmed around, or that the odor of the frizzling fat of the land lingered there perpetually, when, tilted against the wall in his straight-backed kitchen chair, he could reflect at leisure upon the size and brilliancy of the roses that bloomed upon his parlor carpets, the superior polish, length and breadth of his seven hundred dollar piano, and the spick and span newness generally of the portion of his domicile accessible to an admiring public.

But the day of the Greek temples passed and that of Gothic cottages came. Peaks, gables, and turrets broke out in all directions; straight lanes were replaced by circular driveways, and trees were tastefully grouped in the grounds or set in rows outside to indicate the course of the highway by lines of living green. As one good result, the uninhabited portions of the house, intended chiefly for exhibition, shrunk to something like their proper size, and the living rooms crept well around towards the front.

After this came the reign of the Mansard roof, so speedily rung out by fire bells in all directions.

The name of the comfortable farm-house is legion, for they are many. Its general is almost indescribable, and it is much to be feared that no specimen whatever of this most characteristic of American productions was on exhibition at the Centennial. In the beginning it is generally a frame dwelling of several rooms. Growing by external accretions it gains an L on one side, a single room on another, a piazza here, a porch there, dormer windows in the roof, or a bay window on the sunniest side till the original nucleus is entirely lost to sight. Frequently it is half concealed from view by shrubbery, and fruit, and shade trees; well-kept flower beds border the paths, and

"On either hand we see the signs
Of fancy and of shrewdness,
Where taste has wound its arms of vines
Round thrift's uncomely rudeness."

If we enter we will perceive by the presence of home-made rugs and carpets

that old-time industries are not entirely things of the past; by the presence of numerous books and papers that heads as well as hands are given an opportunity of exercise; and by the appearance of the walls that there is no nook or corner in all the land where the voice of the chromo-man has not been heard.

A strong contrast to this is the indifferent farm house, yet bearing sometimes such a resemblance as regards first intention as to appear a mere caricature of what it might have been. An indefinable atmosphere of discomfort emanates from it, the yard and grounds are unkempt and uncared for, the windows are broken, the steps rickety and unsafe, and the very fences seem to have caught an air of discouragement from their unfortunate owner. It is not a pleasant picture. The shortcomings of such homes have been all too frequently held up to view; indeed one might think that they form part of the stock in trade of novelists and story-writers, so frequently have their powers of sarcastic description been exhausted upon the subject. The existence of many such blots upon the landscape cannot be denied; that they are growing less we dare not affirm; it is to be hoped that both their cause and cure will be made manifest by the wise men of the future.

From these glimpses we cannot but conclude that the home of the farmer, though to some extent the exponent of his taste and individuality, is, to a far greater degree than is the case with men of other professions, expressive of what circumstances permit him rather than of what he wills or wishes. On this point interesting statistics could no doubt be collected, showing mysteriously occult connections between a rise in the price of wheat and the absolute necessity of repairs and alterations, between a strong upward tendency in wool, and the cheerful countenances of furniture dealers. Let us trust that ere another century has passed the public, taught by keener penetration, wider ranges of observation, and larger charity, may attain a higher degree of wisdom, and judge of men no longer by their houses or their hats, but by what they are.

Mr. Jessup Wood read the following paper on

"SHEEP HUSBANDRY:"

Mr. President and Brother Farmers: The history of sheep is coëxtensive with that of man. From the time that Abel brought of the firstlings of his flock and offered them in sacrifice, to the time when the shepherds watched their flocks by night on the plains of Bethlehem, and from that time until now, sheep have occupied a prominent place in the husbandry and commerce of all civilized nations.

This of itself is a conclusive argument that he is adapted, if not absolutely necessary to the comfort and happiness of mankind. That he is in fact not only an *ornamental* but a very useful animal. But it is no part of my object on this occasion to give an account of his history, but rather to offer some practical suggestions on his breeding, feeding, and general treatment, in order to turn him to the most profit, for we are very likely to estimate the value of a thing by what we can get out of it proportionately to the cost. Therefore, we rightly conclude that if a thing cost us more than it comes to, the less we have to do with that kind of property, the better for us.

The Science of Breeding as a Fine Art.

We admire, and rightly, the artist who has power and skill as a painter to draw on canvas the likeness of a friend, a scene in nature, or the representation of some thrilling event in history.

We regard with something of wonder and admiration the man or woman who has skill to mould the clay or fashion the marble into the likeness of the living representative, or make it seem the living representative of that which is already dead,—making it a thing of beauty, which is a joy forever.

Think you that he or she who has studied Nature's laws, and has become skillful in their use, so that they can take the descendants of Pharaoh's *lean kine* and in time produce the short-horn of to-day, or the common sheep of Bakewell's time, and produce the noble specimens of mutton sheep which we see on exhibition from year to year, or the small, greasy Merino imported from Spain in the beginning of the present century compared with the Merino of to-day? In short, of horses, of hogs, and all sorts of poultry, which are bred to the nicety of a feather (I mean the poultry, and not the horses and hogs), I say if these are not evidences of as high an order of skill, perseverance, and success as are exhibited in any other department of man's usefulness, then I can't understand what would be.

If he is accounted a public benefactor who causes two blades of grass to grow where only one grew before, I can't see why he is not equally so, who causes two pounds of beef or two pounds of mutton to grow where one grew before (and of better quality at that). The foregoing has opened the way for the discussion of the question before us:

First. What kind of sheep shall we breed?

Second. How shall we breed them?

Third. The prospective reward.

In reply to the first question, what kind of sheep shall we breed? I say *emphatically* let every man be fully persuaded in his own mind. Breed that kind of sheep out of which you are confident, under all the circumstances of your surroundings, you can make the *most*. If you were *born* a sheep man, that is if the love of sheep for their own sake was born in you, and if you have had experience in breeding, and have proper conveniences and have mastered the science of feeding and growing young animals; know how to care for them when well, and what's the matter when sick, and are willing to work for the *fun* of it, and not for pay, then you will do to breed that kind of sheep known as the *full blood merino*, a valuable sheep when properly cared for, and that value in great measure estimated as that of mankind in general, by the *quality* of the *coat* they wear.

No doubt the time is not far distant when the increased demand for mutton for consumption at home and exportation abroad will greatly stimulate the breeding of the large mutton producing breeds of sheep. But we shall fail to succeed with them if we forget that they are large, and consequently we can't keep so many as we can of the smaller kinds of sheep, also that that they have attained to their present form and size by a process of breeding and feeding with which most of us are little acquainted, therefore we shall need time and experience to insure success.

The facilities for marketing whatever we have to sell are now so good that we need hesitate no longer about producing fancy articles of food for distant cities. The fast increasing demand for such food gives assurance that he who is first to meet this demand will find his reward. You who have watched the ready sale of early lambs for the summer market know that it is a paying business, and one I think there is small prospect of being overdone. A cross of one of our large mutton breeds on our common ewes, to be dropped in January and pushed with a generous diet until ready for market, I am confident would

give satisfactory returns. With such an object in view, success would almost wholly depend on care and skill in feeding.

I am thoroughly convinced that in the present state of sheep husbandry, the poor conveniences and the slipshod manner in which most of us breed and care for our sheep, the best, because the most profitable, under the treatment which they are likely to get, is the *Grade Merino*: hardy, capable of withstanding almost any amount of exposure or starvation, and opening not her mouth under the combined cruelties of washing and shearing, in the manner it is usually done. When fully matured and well fattened, they supply the great bulk of the mutton of this country, and the demand is fully equal to the supply. They are already acclimated, have become used to grubbing for a living, so that with ordinary care and attention I believe them to be more profitable than the more highly-bred and better kept breeds. These have only attained their present degree of perfection from a system of skillful breeding, generous keep, and great care for a long period of time, and now to change all the conditions under which this great improvement has been made, would result sooner or later in the loss of the superior qualities which distinguish them from the common herd; but it has often been done and will be again.

Another consideration of importance not to be overlooked in our subject is the production of wool. It is true that the price for two or three years has been low; so it has been with most other farm products. How has it been with wheat, one of our principal crops? It has hardly paid the cost of production, not taking into the account the drain upon the soil and the risk of the crop. Compared with wool, it comes out second best in whatever light you view it; for while one drains the soil the other improves it. While wheat costs all that it comes to, wool really costs but little and no risk of a crop.

The better you keep your sheep the larger your clip of wool will be, so that instead of loss there is really gain in feeding well. Usually the increase of the flock will pay all expenses, and whatever the wool comes to is clear profit; so that the sheep never dies in your debt. Therefore we claim that no stock pays better, and certainly no stock is as valuable in restoring the lost fertility of our farm.

Having now given some of the reasons why we think our *grade sheep* the most profitable for the general farmer, we will next consider some of the principles of breeding by which they are to be improved and made more profitable.

In the first place we want to know what we wish to accomplish. If we aim at *nothing*, we shall be very likely to hit it. One of the first principles in breeding by common consent is that "*like produces like.*" Now, I understand this to mean something more than that. "All things produce after their kind" in a general way. Then what more is meant, I ask? Let me illustrate it. We will take a flock of grade ewes,—say fifty,—just such ewes as you will find any where in the country that will average five pounds of wool per head. They are not all as near alike as two peas, nor were their dams or grand-dams, so you see there is a right smart chance for variation. Well, now, you select for a sire to mate with your flock of ewes a sheep possessing as many of the qualities as possible which you wish to obtain in the progeny. Your male, of course, should be superior in all respects, so far as possible, to the flock of ewes. You make the cross. Now apply your *axiom*, that "*like produces like.*" But you have a male quite unlike, being much superior to any female in the flock, and no two of your females alike. What is the result in fact? It is that while some partake more of the qualities of the sire, and are superior to the rest,

other some being modified in their characteristics by both parents, are an improvement on their dams, but not equal to the first, and the remainder partaking more still of the qualities of their dams or grand-dams, are scarcely any improvement over their mothers; but, on the whole, you have made an advance. The majority of your lambs are superior to the old ones.

Herein you have the fulfillment of the principle that "like produces like," not in peculiar characteristics, perhaps, invariably, but in general results, in the ever progressing onward toward the end aimed at, with an ever increasing tendency toward that end. Your old ewes averaged five pounds; you have done well if the lambs average six. No doubt many of you have done even better than that. There are two or three more elements of success, quite as important to be taken into the account as the foregoing.

The first is that of selection. There is no *one* better test of a breeder's skill than that of uniformity or family likeness, and there is no one thing upon which this likeness depends so much as the selection of the male which he uses. Here he can only depend on the skill which he has gained by observation and experience. Even suppose he has been tried, the test amounts to but little in his case, inasmuch as he has not been tried on his flock or herd. There he must be guided by his knowledge of how the animal was bred quite as much as by the characteristics of the animal himself. Of course there are certain points which must be so *prominent* and *strong* that to lack any one of which would be a *serious* objection. And the first and most prominent among these is the constitution. The next is *size*,—not *oversize*,—but full medium, or a trifle over, a general masculine appearance, even to a little coarseness is not objectionable; but the most foolish thing in the whole business in my opinion is for men to seek after, and pay for, what we call *fancy points* to use on grade animals. Neglecting the weightier matters of the law, they are fooled with this mint, anise, and cummin business to their own hurt. You will understand me as talking of grade sheep. One thing more, which I consider worse than useless on a mutton and wool sheep is wrinkles. They are of no earthly use on such sheep, and are right in the way. Now we come to selection by the weeding out process. We are all aware of the improved appearance of fruit or grain by this process,—no less of flocks and herds. It is an old and trite saying that there is a "black sheep in every flock." If that is not the case in fact, it is nevertheless true that there is some in every flock that don't add to its credit; therefore weed them out with an unsparing hand, but please remember that it is not the worst looking sheep that is always the poorest. There are some that will not produce a good lamb under any circumstances; sell her for mutton or to some breeder that is not so particular as you are and should be. If you should follow the foregoing rules for 20 or 25 years, my word for it, you will have the satisfaction of hearing your neighbors tell you that you have really a fine looking flock of sheep (a fact that you probably would never have found out), which ought to be ample compensation for all your labor and care, provided you have connected with your breeding the science of feeding, which we will now consider under the following heads:

How to Feed, when to Feed, what to Feed.—First, How to Feed.

If feeding with your flock around you, do it deliberately and quietly. If it be hay or straw be careful not to carry it over their backs, for in so doing you will avoid getting dirt and chaff in their wool, and frightening them, let them learn not to be afraid of you, cause them to know that you are their friend. I

like to feed at least once a day in the fields away from barn or shed, and on the ground when the weather will admit of it, that is, when it is not stormy, and where it is clean, away from the barn, so as to give them the proper amount of exercise, which is next in importance to their feed. In stormy weather, or when soft under foot, feed in racks or some sort of manger so that they can't get their food under their feet and dirty and waste it.

When to Feed.

In extremely cold weather when sheep have a good shed to lie in (if you did not forget to give them their supper the night before) eight o'clock will find them not uneasy about their breakfast, but quietly ruminating on what they got the night before; therefore as the cold of the night begins to yield to the influence of the day, I consider it about the best time to feed. I prefer feeding grain at noon or night, as I find they eat it with a better relish than in the morning before stirring around some. Regularity in feeding should be strictly adhered to, whether it be twice or thrice a day. I know that many farmers are at fault on this point, and I believe it to be of more importance than most of us regard it. When the usual time approaches for receiving our meal we like to see at least some indications that we shall get it; but if we are compelled to remain some time, be it longer or shorter, in suspense, it is apt to create an anxiety and uneasiness which is detrimental to that peace and quiet which is absolutely essential to our making the best use of our food when we get it, and this truth will apply with even greater force to our domestic animals. It is a law of our nature, and may not be violated without suffering the penalty. When one meal is digested then hunger compels them to look for another, and if from habit they have learned when to look for it, there will be no waste of force in that unrest and uneasiness which those animals feel that are irregularly fed, or miss every now and then a meal, and whose condition plainly shows the ignorance or negligence of their owners.

Lambs should have three feeds per day, as all young animals need less at a time and oftener. If your hay be nice, fine and sweet, they should eat it clean, if coarse or of poor quality what is left should be given to horses or colts, as they seem to like it and will readily eat it; at all events clean the racks or boxes before feeding again.

What to Feed.

The sheep eats a greater variety of food than almost any other animal when they can get it. Therefore feed as great a variety as possible, changing from one kind to another, and you will be surprised at the increased relish with which they partake of their food, and consequent condition of thrift which they will exhibit. Oat and barley straw I consider valuable for feeding full grown sheep once a day. Think it pays to cut early and take pains to cure nicely, put in my bay when I thresh, and feed in shed at night. But there is one kind of food which, as I use from year to year, I think more and more of, and that is the root crop. I consider that kind of root most valuable which can be raised the easiest,—the sugar beet, the mangold-wurzel, or the bage, each or either supplies a need in the *animal* economy which can not well be met by any other kind of food. Wheat bran coming the nearest to it of anything practically available. He who best understands the needs of the animal, and supplies that need from the first stages of its growth until it is fully developed and matured, will be the most successful in supplying the demand for first class animals at

paying prices. Therefore we conclude that however well skilled a man may be in the art of breeding, it all goes for naught unless he also understands and practices the science of feeding, which includes some knowledge at least of animal physiology combined with a knowledge of the properties of different kinds of food, and which, and in what proportion to feed to best accomplish the object in view. For instance, the main object in feeding young animals is to make them grow and not to fatten them. Consequently we should feed them on such food as will best promote their growth, and there is no other kind of food so well adapted to accomplish it, for the first half year, or year of its life as milk. Great care should be exercised in changing the food of all young animals especially; let it be done very gradually, as their digestive organs are weak and very sensitive, and are easily disordered, and the growth of the young animal receives a check that it will not soon recover. Over feeding the young is almost if not quite as hurtful as starving, and once let it become stunted from either cause, and you have failed on that animal; not ruined it perhaps, but you have failed of making of it what you might and ought to have done. Some of you may like to know whether I speak from experience; to gratify your curiosity I will say that I have been there. Having now glanced in a cursory manner at some of the more prominent facts of our subject, a few thoughts on the third and last division of it and I am done.

The Prospective Reward.

It seems to me there never has been a time in the history of our nation when the outlook was so bright and full of promise as the present for the breeder and producer of extra articles of consumption. It is only a very few years since we commenced to export the products of our dairy to England; and you all remember the cry that came back, that our butter and cheese did not fill the bill,—that it did not come up to the standard, and it was a failure. They forgot that these were the products of the Yankees, and that as soon as we got acquainted with their peculiar tastes we could tickle their palates to a nicety. And so we have. I can't give you the figures (I wish I could); but our trade with her in these articles is simply immense, considering the short time since it began.

Our success in this line is beyond question. It is no Yankee guess, that beef and mutton, as well as bacon, in the near future are as sure to follow in the tracks of our daily products, just as sure as daylight follows darkness.

Less than two years ago we commenced to send dressed beef to Europe. It was a trial experiment, the cost of fitting up refrigerator compartments on board the steamers being so great that it was simply an act of prudence to test the thing thoroughly.

The result is that most of the steamers on several of the lines now take out a regular supply of beef, averaging nearly one thousand carcasses per week from New York alone, and about five hundred from Philadelphia. The shipments from New York during the past year were about 22,500 heads, the amount being small at the beginning of the year and closing with 1,350 the past week closing with January 3d.

Besides the beef sent abroad, a few dressed sheep have been included, and it is probable a regular trade in mutton will yet be established. Who says the world does not move? The consumption of sheep in New York city the past year foots up 1,228,820, which I judge to be about one-third of the whole number consumed in the United States. Now what does all this indicate but that

he who produces an extra article for consumption will get an extra price for it? Remember that this foreign call is not for Texans and the scalawags of Michigan, but for beef and mutton and bacon of the *first quality*. It is high time to improve our stock. Therefore, let me urge you, brother farmers, to look well to the state of your flocks and herds, for the time is at hand when you will be rewarded.

DISCUSSION.

Mr. Pearson.—What is that disease in sheep which causes dizziness, drooping of the ears, and partial blindness?

Mr. Wood.—Worms in the stomach and bowels. For this disease I have used spirits of turpentine and castor oil; two parts of the former and one part of the latter, giving one teaspoonful for a dose; sometimes, apparently, with good results, though not invariably so.

Mr. Pearson.—What treatment would you recommend for grub in the head?

Mr. Wood.—Blow tobacco smoke or inject tobacco juice up the nostrils.

Mr. L. R. Brown read the following essay on

“THE RELATIVE VALUE OF CORN FOR SOILING AND WINTER FODDER.”

Mr. President, Ladies and Gentlemen, and Brother Farmers:

These State Institutes, as I understand it, have been organized throughout the State for the benefit of the farmers. Mind coming in contact with mind an interest is created, experiments and experiences are given, thoughts and suggestions expressed, that carry conviction with them, sowing the seed that we trust will produce an abundant harvest.

Taking this view of this meeting, I am here determined to carry home something of value to myself,—something to work out on the farm. Feeling a deep interest for the class I represent, and realizing that *all* ought to take *part* as well as listen, I have consented to give my experience on growing corn for soiling and winter fodder for stock.

During the excessive dry seasons just past, together with the unfavorable spring months, our clover crop was almost a total failure. Looking over my prospects for a hay crop in April four years ago, I found two-thirds of my clover dead, having scarcely enough left to pasture my stock through the season. I resolved on making an experiment of growing corn fodder to supply the want of hay. I planted four acres in rows three feet apart, and in hills one foot apart in the row. The result was from careful estimate twenty-five tons of most excellent fodder for both cattle and horses. This experience induced me to plant ten acres the following spring with equally satisfactory results. I have continued to raise it since, and am abundantly satisfied that five acres of good fodder corn will be of more benefit to any farmer than ten acres of good clover hay. For milch cows I am satisfied it is worth very much more, also as forage for fattening stock.

As a soiling, or green fodder crop, to supply the place and deficiency of good fall pasturage, that is seldom found on a small farm, it ranks among the best, if not *the* best. For milch cows it is most excellent, increasing the flow of milk, while the weight of the animal is maintained, and an appearance of thrift indicated as by fresh pasturage early in the season.

Necessity forced me to make the experiment. The result has been quite satisfactory. I shall continue to grow corn for soiling late in the season, also for winter forage for my stock.

My manner of growing and curing the crop is simply this:

Early in the season, say from the 10th to the 20th of May, I have my ground ready to plant. Pulverize the soil well by harrowing; mark out in straight rows $3\frac{1}{2}$ feet apart, and with a corn planter drop from 7 to 10 grains in each hill, one foot apart. As soon as it is up nicely I put my 40-toothed harrow into the field lengthwise of the rows, and harrow it well. This kills all small weeds, stirs the ground, and produces a vigorous growth. When six inches high I go through with a cultivator, and continue this at intervals until the crop shades the ground.

The growth of stalks will be slender and about five and one-half to seven feet, average height.

The variety I raise is dent; have raised flint and sweet corn; but everything considered prefer the dent corn. Planted early, it matures early; and the last week in August, or when the small ears (for there will be some) are fit to boil for green corn, put in the corn cutter and shock it up in large shock, tying the tops securely, and your labor is completed until October; then it will be sufficiently cured; take down your shock, bind in four or five bundles, and haul to the barn and put in bulk. It is cured green, fresh, and nutritious, and it is all greedily devoured by stock. I am wintering eighteen head of cattle and horses this winter on such fodder, and I would not exchange it ton for ton for clover hay. The best results will be attained by planting early on good land and keeping the crop clean by frequent cultivation.

By this means small farms may be enabled to raise more forage, winter more stock, lengthen out the short pasturage of the fall months, and have their stock go into winter quarters in a thriving, healthy condition, and with proper care they will never show the change from the field to the stable, but continue to thrive and increase, with comfort to themselves and pride and profit to the farmer.

The excessive drain on the soil of our State from its early settlement to the present has had such a telling effect on our farms that many have come to the conclusion that in order to succeed the number of acres must be increased to produce anything like paying results; when the truth is, less land and better farming, the application of manure and stimulants to restore the soil to its primitive state, is the only key to success. To provide this we must necessarily keep stock to supply manure.

Economy suggests that such crops as produce the best results at the least expense, the most food on the least number of acres, will be found the most profitable to all classes of farmers, more especially to those on small farms. With very little grain and a few roots I have been able to feed 18 head of stock, keep them in good, thriving condition $3\frac{1}{2}$ months on four acres of fodder corn, fed in the usual manner. I am satisfied had I been enabled to cut the fodder fine, steam or cook the same with a little extra care, I could have lengthened the time at least another month. Taking the average crop of clover hay, it would have taken the crop of twice the number of acres to produce the same amount of forage, and I question whether the result would have been as satisfactory.

Does not economy suggest to the small farmer the advantage of wintering a much larger stock than he can pasture during the summer? With grain, roots, and corn fodder may he not be able to send to the market his surplus beef cattle in the spring at an increased valuation sufficient to cover cost of grain, roots, fodder, and care, at least leaving the manure heap as his interest on capital

invested six months before. This calculation is a very low estimate and a safe basis from which to draw conclusions. The question ought not to be how many acres we can plow and sow, but how much we can produce from the least amount of acres with the least outlay, improving the farm in its producing facilities every year. To accomplish this the investigations of science as applied to the avocation of the farmer, combining theory and practice, experiments, thought, and study. The successful farmer should be a close observer, a constant student, striving continually to keep himself posted in every department of his business. Brain work is as essential as physical force. Books, papers, and periodicals devoted to farm life should be his constant companions. Farmer's meetings, discussion of farm topics and household duties will arouse and awaken an interest when wisely conducted that will have a telling effect on the *present* status of the farmer and be instrumental in directing the coming man to higher and nobler attainments in the future, blessing the world with the influences that must necessarily follow, elevating the tone of society and making the world wiser and better.

DISCUSSION.

Mr. Spencer.—I can hardly agree with Mr. Brown's method of raising corn fodder. We can raise a large quantity of corn and stalks too.

Mr. R. Williams.—That has been my experience also. I have tried both ways, and I find that with care in curing the stalks we can have both a great quantity of fine fodder and a crop of corn.

Mr. Brown.—One great advantage of the method that I recommend is, that the stalks can be cut up early and more perfectly cured.

Mr. G. Sherwood.—I have never been able to cure corn stalks so that they will not mould.

Mr. J. W. Wing read an essay on "An Improved Agriculture and its Influence," of which we have not the manuscript.

At the close of the afternoon session some time was devoted to the discussion of the subject presented in R. F. Johnstone's address.

EVENING SESSION.

Hon. T. C. Abbot, President of the Agricultural College, gave an address on "*Schools of Agriculture.*" (See lectures and addresses as above.)

Mrs. Emma Randall read the following essay, entitled

"THE REAL AND IDEAL."

Says a farmer in the Tribune: "Several years ago I read a sketch of a Country Gentleman that exactly described the kind of a farmer I should like to be. I should enjoy owning a large farm eligibly situated near a thriving town or city, the house a large, roomy, substantial mansion, built for all time, and surrounded by grand old trees,—its location an elevated one, commanding an extensive view of a diversified landscape. Here I would dispense hospitality to my friends, and be a sort of agricultural general, issuing orders to those in my employ. My live stock the choicest of their kind, and all sorts of labor-saving

apparatus for carrying on the operations of the farm. My living room should be made cheerful by opening into an extensive greenhouse, filled in winter with rare and beautiful plants." That is an ideal picture of what a farmer's home should be, and is so attractive that if one might have the wonderful wishing cap of childhood fairy stories, every man would lose no time in becoming such a farmer; but unhappily for us the magical cap has lost its power, and we have debts, and poor land, and adverse seasons to contend with. In short, we find farming not an "unmixed good" by any means. Our strawberries and cream are not obliging enough to walk on the table, already to be eaten, nor do the fields produce bread already spread with butter. The *weeds will* grow, if nothing else, and the potato bug occasionally claims a share in your potato crop, has been known to claim all. Jack Frost gets a funny streak, and out comes the clover by the roots; while if you think to cheat the old fellow, and have your wheat get such a root it *can't* be killed, the insect gives your field a call, and it begins to look sickly, while the poor farmer *feels* so. You care for and cultivate your fruit trees continually, but after all the borer will infest the tree and the codling moth your fruit, and once in a while a man in meeting with the "hard reality," and finding it so devoid of beauty and attractiveness, so different from the broad free life he would like to lead, declares in sheer disgust, that farming is the worst hoax a man ever entered into. It *is* hard sometimes, this falling off from the ideal, for most are not wealthy who begin farming, many indeed poor.

It needs what the New Englanders call *gumption* to make a successful farmer,—one who can take advantage of circumstances, and has the knack of knowing how and when to do, and the best and shortest manner of doing work. There is so much time and force wasted in unproductive labor. Some men work in a peck measure all their lives, and work hard. There are farmers and farmers, but fortunately one class are growing rarer every year. I mean the farmer whose sole idea is money-getting,—who never spends a cent for improvements, who lives in an old tumble-down house, makes shift with a miserable old shell of a barn, never has a decent fence on his place, and would think himself *ruined* to plow under a crop of clover to enrich his poverty-stricken fields. One who is *poor* and cannot improve, all heartily sympathize with; but a man of means, who will treat his farm and family in such a manner, deserves what in most cases is felt,—the contempt of every neighbor farmer. Every year we get nearer the ideal, slowly, but there is a growth, and people are beginning to realize that 'tis the intelligent, systematic man who succeeds,—one who is willing to pay interest to the soil for what is given him, and finds dame Nature so generous that it is returned a hundred fold.

Only the few can reach the grand, substantial farm house, with beautiful rooms and costly furniture. That is a shadowy ideal which we may never reach, but they *can* have pretty and convenient dwellings, with picturesque gables, and clinging vines, and, best of all, grand, old stately trees, instead of the unsightly barn-like structures, whose windows stare at you, with no tree, no flower, nor vine, to soften the ugliness and make it seem more attractive. They can have cool verandas and nice roomy kitchens, where there is plenty of light and air, instead of the little, tucked-up, close rooms where the farmer's wife spends two-thirds of her time, and no small share around a stove cooking, and then wonders why her head should ache so. I'm inclined to say it serves her right, for the ladies are in fault full as much as the men, so afraid are we of soiling other rooms, even though there be a dozen, when, if we only knew

it, the sunshiny kitchen with its bare, white floor and walls, and nodding roses at the window, is far more attractive than the darkened parlor with its stiff-backed chairs and sofa, ranged in awful state, its carpet and curtains which the sun must never see, for fear it might fade the one and rot the other. After all you may do to it, 'twill be the most unfriendly room in the house, the one where you never care to sit and rest or read, and where the echoes linger, as if not used to gleeful voices. We can have rooms different from this, wonderfully pleasant, without the expense of rich furniture or even being really handsome in themselves, so much is done by good taste. If we can not have the ideal greenhouse, with rare and beautiful plants, there are queenly roses will bloom even when uncared for, delicate lilies rivaling the choicest hot-house beauty in fragrance, snowy chrysanthemums that will stay until Christmas time if only given shelter, and the morning glories will toss their lovely tinted bells at your window, summer after summer, self-sown, if only given a seed-bed, and something in summer time round which to twine themselves. We are too prone to strive after effect. Here is a misguided mortal, who, laboring under the impression that he is adding to the beauty of the surroundings, will fell every forest tree, and fill a yard with dwarf evergreens, while you feel as if one whose sense of the beautiful is so distorted, *might* be guilty of abusing his own grandmother. Not every man can be a prince among farmers, with help at his nod, nor can he dispense hospitality as he would like, but he can be a systematic, thorough farmer; can keep good stock with a little care; can have fruits and flowers and grand old trees, and tasteful grounds; can make his land so productive that it will yield double what it now does, and in all this he is a public benefactor even while benefiting himself, and is nearing the ideal farmer and farm every year. Remember what Emerson says on hospitality: "I pray you not to cumber yourself and me to get a rich dinner for this man or woman, or a bed, made ready at too great a cost. These things if they are curious in they can for a dollar get at any village. But let this stranger in your looks, in your accent and behavior, read your heart and earnestness, your thought and will, which he cannot buy at any price. By all means let the board be spread, the bed prepared, but let not the *emphasis* of hospitality lie in these things." Such an ideal of being hospitable lies within the poorest man's power. It is simple and beautiful, and without it all else would be sham.

Our ideal in dress is all of elegance and costliness, yet an intelligent face will make the simplest garment seem becoming, and one often sees a common print worn with more grace, and look far more tasteful, than the richest silks and rarest laces, so hard is it to cover what is coarse and uncultivated, even when we have all outward elegancies to help toward our ideal of beauty and refinement. The schools, the books, the culture, are within the reach of every farmer's son and daughter, to help toward that ideal, and if the time comes when costly dress can be afforded, it will only make the intelligent face more beautiful, the refinement a little more distinct, but can never take their place. When we come to see the ideal is not far off, that with patient endeavor we make it in part at least real, when we *feel*, as we *say*, that the mission of bread-giver is one of the noblest as well as necessary, when we magnify our calling till a man is *proud* to be called a farmer, when we find an intelligent and cultivated people throughout the country side, and all this can be and is being done, then indeed will the ideal farmer and farm become a fact. How much more fitting that a man when he is grown old should spend his last days where his life-work has been done, and there is something far more beautiful in the

thought of a lovely old farm house and its owner growing old together, than the half deserted dwellings, broken gates, and tumble-down fences which mark the tenant's arrival and the owner's removal to a town.

Prof. Ingersoll gave an address on wheat culture. (See lectures and addresses as above.)

The following papers were read at this session, which do not appear in this report: "Corn Culture," etc., by Mr. William Lambie; "The Deterioration of our Cereals," by Hon. John J. Robison; "Value in Farming," by Mr. William Campbell. Manuscripts of the last two have not been furnished to the Secretary.

The following resolutions were unanimously adopted:

WHEREAS, This Institute has been a decided success, and most satisfactory to all who have attended it, both in respect to the variety of the subjects treated and also the care and ability shown in the preparation of the essays presented, all of which have embodied practical information most valuable to every farmer, and we believe to all others in attendance, therefore

Resolved, First, That the thanks of this assembly be tendered to the Professors of the Agricultural College and to all others who have written essays for this Institute; also to the Chairman, who has so ably presided over its deliberations; the executive committee, the committee on music, and the Light Guard Band, for their assistance in making this Institute a success.

Second, That we believe it is for the best interest of all who are engaged in agriculture that a Farmers' Institute be held annually in this county.

President T. C. Abbot said: It will give me great pleasure to report to the State Board of Agriculture the success of this Institute, the large attendance, the number and excellence of the papers presented, and the interest which has been manifested by you all. In behalf of the State Board, of which, together with your presiding officer, I am a member, I thank you for the interest you have taken, and congratulate you on the success of your Institute.

The Institute was then declared adjourned.

HILLSDALE INSTITUTE.

This Institute, commencing Thursday evening, January 25th, was held in the court house. The attendance was large throughout, and at most of the sessions those who arrived late found it difficult to obtain even standing room.

At the time appointed the meeting was called to order by Col. F. M. Holloway, that gentleman having been chosen President at a previous meeting.

Prayer was offered by Prof. James, of Hillsdale College, after which President Holloway gave the following opening address of welcome:

LADIES AND GENTLEMEN:—We have met this evening under most favorable circumstances, to enter upon the work contemplated in the call for a farmers' institute. This is no more or less than a means by which thought may be brought in contact with thought and experience on natural subjects connected with, and the basis of the every-day life of, the farmers of our county,—not that we are different from others in wants and desires, but that we are individually and collectively responsible for the standard of society of which we form an integral part. It has been true of us in the past, as it is true of many communities of our common country to-day, to look upon agriculture as but the

child of chance,—that we are to plow and sow, then abide the will of God for the harvest, and our work and responsibility are done. Through a better understanding of the laws of production, superinduced by a more universal system of education, these theories of chance have been exploded, and the inquiry to-day is to know more of the laws that govern the universe. We desire to find the ways that lead to the greatest enjoyments as we travel the journey of life; we desire to know more of the laws that govern the vegetable kingdom,—“we have rejected the chance theory,” and it becomes us to understand the foundation of the structure on which we are resting our hopes. We desire to understand more and better the animal kingdom, which has been made subservient to man’s interest. And we desire further to learn the nature and character of the insect world, that for inscrutable reasons are visiting us from year to year, preying upon our crops, our stock, and our fruits. Above all do we desire to pry deep into those laws of political economy which will teach us how to select for profit, and especially how to dispose of our labors without waste. In short, we desire to place the ancient and honorable art of agriculture where it once stood in early time,—at the head of the professions. For these reasons and others that might be mentioned this institute was called. It is one of a series that are being held in the State this winter, having in view the objects and purposes which we have stated. These institutes originated with our State Board of Agriculture last year, being principally conducted by them and the faculty of the Agricultural College. We apprehend that they were not fully satisfied with the results from the fact that they require parties having the benefit of their instruction this year to do half the work,—in other words, they must produce half the thought, although it may be crude, and advance half the theories, however thin.

The committee who have charge of the programme have undertaken to provide for the presentation and discussion of every material question vitally effecting the Hillsdale county farmer. These will be called up in due course, and responded to by those who, from experience and observation, will be able to instruct. Each subject will be open for discussion, and we invite criticism.

As a means of making these sessions interesting and thoroughly practical, we have with us several of the faculty of the Agricultural College,—men who have made the science of agriculture a study, who can talk agriculture both in theory and practice, and who will favor you with at least one lecture each session on some particular branch. We expect some of the best agriculturists of the State to take part in these councils with us.

We look to permanent good to the agriculture of the county from this meeting; it cannot be otherwise, from the acquaintance formed, from the theories advanced, from the systems elucidated and plans submitted—it must form a mint of information to the thoughtful student from which he may draw inspiration in after years from which to practice or experiment for a more beneficial result than he has yet attained.

It would have been a pleasure to me had the meeting that organized the institute selected a younger and more experienced person for permanent chairman. I cannot, however, shrink from any duty imposed upon me that looks to the elevation of the standard of agriculture in our county.

In conclusion, we welcome you, farmers of the county, to this meeting, because of the desire you manifest in coming from the north and south, from the east and west, through the frosts and cold of winter, to elevate and magnify your honorable calling. We welcome you, citizens and friends of other coun-

ties of our Peninsular State, to this meeting, trusting that you will feel at home with us, take part in our deliberations, giving us your experience in matters that interest us alike, and as you leave us, feel that it has been time profitably spent. And to you, Mr. President and gentlemen of the Faculty of the State Agricultural College, we welcome you to our county as the representatives of the first Agricultural College in America; we welcome you for the marked reputation you have attained in this and other States in applying the science of the schools to the routine labors of the farm; we welcome you because of the anticipation we cherish that we are to draw practical and lasting benefits from the thoughts and ideas advanced by you, and, lastly, we welcome you as the representatives of a practical education designed especially for the sons of farmers, fitting them more efficiently for after duties in life.

President T. C. Abbot spoke on "Schools of Agriculture," and Secretary Baird on the "Farmer's Home." See lectures and addresses at the close of this record of the Institutes.

Mr. S. N. Betts, of Adams, read a paper on "Swine and their profits." Manuscript not furnished.

The following paper by W. H. Reynolds was read on

"THE CULTURE OF SMALL FRUITS."

The first thing to consider in the planting of small fruits is, in our opinion, to select a spot of ground the drainage of which is well provided for in nature. We think the quality of soil depends very much upon the variety of fruit desirable to put upon it. Perhaps there is no one item in the whole catalogue of small fruit culture as much neglected as the cultivation of strawberries. This is partially through ignorance, for how frequently do we see that the selection made for the strawberry patch is in some by-place, or where the soil is too hard to cultivate for garden purposes, and a few plants put out here and there, without form or order, are left for some boy to tend. He does so by pulling a few of the larger weeds now and then, or, per chance, his youthful ambition is excited to the extent that he seizes the hoe and labors desperately for a time, but the ground is too hard for his strength. He is soon tired and discouraged, and thus ends the cultivation of the strawberries, and with disappointment the proprietor looks for a crop and concludes it don't pay, when the truth is the vines have been robbed by the weeds and drouth of the moisture necessary to their growth; while, on the contrary, the selection for the strawberry should be a good, arable piece of ground, easy of access, with a sufficient amount of compost applied as to thoroughly enrich it. Then it should be spaded or ploughed thoroughly, pulverizing to the depth of ten inches. The plants should be of different varieties, so that no doubt will exist as to their fertilization. They should be planted at least two feet apart in rows, and if the rows are put four feet apart, the larger part of the labor for the cultivation the first summer may be done with a horse and cultivator. About the time the ground freezes in the fall they should be covered with a good covering of coarse straw to protect them through the winter, and this may be left, by opening a place for the plants to grow through in the spring, to protect the ground in case of drouth and keep the weeds down until the crop is secured. This will be of benefit also in preserving the fruit from injury by the dirt. With this care our expectations will be more than realized.

In conversation upon this subject with the late Peter Strunk, of this place, he said that in the season of 1875 he sold \$250 worth of fruit from less than one-half acre of ground.

For the culture of blackberries and red raspberries over-rich soil is not as good as soil that has been run a few years,—in fact, were we to take our choice of a poor piece of sandy land, or rich, heavy clay or loam for such, we would choose the former. The plants, of course, will be more dwarfed in growth, but if the sprouts are kept down and the ground well cultivated, the ones left in the hills or rows will make a sufficient growth.

If grown on rich soil the wood is liable to be springy and tender and easily killed by the cold in winter, and if not killed are not so sure to produce a paying crop as those on poorer soil and of less growth. If the soil is very light and poor, and the plants make too small a growth, the application of a small amount of leaf mould or well rotted compost about the roots will produce the growth desirable. By this method, and a proper amount of pruning, you may receive a paying amount for the investment, in a crop of berries on soil that would be called too poor to produce white beans.

In this connection it may not be amiss to state that red raspberries will prove an absolute failure if allowed to grow broadcast over the ground, but if well cultivated can be made one of the most productive of small fruits, and this may be done with less labor and expense than will be required with many of the other varieties. As to the merits of this berry we need only to say that it is just coming to be considered one of the most desirable and delicious dishes for the table.

In testimony of the productiveness of some varieties of red raspberries we would refer you to the following: In the spring of 1871, I set 450 plants of the Philadelphia, and in the season of 1872 picked what I supposed to be a good crop, but in 1874 the yield told in round numbers was 72 bushels, which sold on an average of twelve-and-a-half cents per quart.

The soil for the different varieties of the black-cap raspberries, we think, should be of a better quality than is necessary for the blackberry, and if poor would require certainly double the fertilizing qualities to secure a success of their cultivation. We have picked in one season as the production of one acre of these berries 3,000 quarts.

The grape we should class as the most healthful luxury in the whole catalogue of fruits, and it would be an effectual offering to tempt the appetite of an epicure even, yet how few, comparatively, of the rural homes, enjoy it. Why the apparent neglect of farmers to provide for an abundant supply for family use of this most wholesome luxury is a query of the age.

No land owner, whatever, should be without small fruit, growing in a quantity sufficient for his own use.

In summer there is no more agreeable dish than a plate of strawberries, raspberries, blackberries, or grapes, and with a little thought and care in planting the different varieties of these fruits the arrangement may be so complete as to provide a daily supply of these luxuries (which should come to be esteemed as necessities) from early in June until the frosts of fall should cut them off. Then in winter, perhaps, there cannot be any greater table relish supplied than is furnished by the preserving of these small fruits.

But in thus urging the necessity of the cultivation of small fruits we would not be understood to recommend the farmer to engage in it as an enterprise, with a view to commercial profit. Although we do hold, as we have said before, that the compensation from the cultivation of small fruits is so abundant that not a single farmer can afford to delay longer the necessary provisions for a full supply for his own use.

We have been requested to dwell largely upon grape pruning, but in the time allotted us it would be vain to attempt to give an adequate idea of this part of the subject.

People have been so befogged and bewildered upon this by reading different books and articles that many are fearful to apply the knife or use common sense in pruning. It is at least a trite saying, "if you spare the rod you spoil the child," and it is certainly true if you spare the knife you will spoil the vine.

The subject of "Farmers' Gardens" was treated in a paper by Mr. L. Hubbard, of Wright. As this paper is very similar in character to those on the same subject published in connection with the Greenville Institute, we have not thought best to publish it in this report.

MORNING SESSION.

Opened with prayer by Rev. W. W. Raymond.

Prof. Beal read a paper on "Apple Orchards." See addresses and lectures at close of this record of the institutes.

Mr. S. B. Mann, of Adrian, read the following essay on

THE ALDEN PROCESS OF FRUIT DRYING.

MR. PRESIDENT AND GENTLEMEN:—I have been invited by your Executive Committee to read an essay on "The Value of the Alden Process" to the farmers of your county. This is no doubt from the fact that I am rather largely interested in an Alden fruit preserving factory. I beg to say, however, that the farmers of Lenawee county, as I understand my credentials, did not send me here as a speaker before this Institute, but simply as a listener, and to bring back to them a report of its proceedings and deliberations for their benefit. I do most gratefully, however, appreciate the compliment paid me, and in behalf of the club thank you for the honor paid their humble representative for placing my name on your programme among so many illustrious agriculturists of our State.

The Alden process of preserving fruits and vegetables is simply that of pneumatic evaporation, or in other words, chemically extracting the pure water from the fruit,—a drying process carried on in a current of heated though moist atmosphere, the thermometer standing at from 200° to 240° where the fruit enters the evaporator. As I am not a vendor of, or in any way interested in the sale of the machinery or the process, what I may say will be simply to give my practical knowledge of its value, as requested, to the farmers. I trust it needs no argument to prove to you that anything that will preserve from decay and hold in its natural condition for an unlimited time our many luscious fruits and wholesome vegetables is of value; and not only that, but takes from it only that part most easily supplied and the most burdensome in its transportation to a distant market.

Take apples for example, and by this process we take away about 80 per cent of water, reducing as we do the bushel to about five pounds, after the skins and core are removed.

Practical knowledge, however simple, is of more true value than all the theories

of the profoundest philosophy, hence if I give you the practical results of the factory with which I am connected, you may be able to form a more correct answer than by any other way.

There are said to be an almost endless number of fruits and vegetables that can be preserved by this process. I agree that the water can be extracted from anything that contains water; also, that it is a known law that few things decay without the aid of moisture in some way. But it is true, in my opinion, that some fruits and vegetables cannot be profitably handled by this process. Corn, tomatoes, peas, string beans, cabbage, pumpkin, squash, apples, peaches, and some of the small fruits can be preserved in a state almost if not quite equal to the green fruit, and far better than by the canning process. Apples have been the extensively used by our company of any one article. Our factory has four large sized evaporators, and under ordinary management is capable of working up near three hundred bushels of apples in twenty-four hours.

During the last fall apples were so plenty and cheap, and other fruits and vegetables so scarce and high, that we did not handle anything but apples.

The factory started the last week in August and ran till about the 20th of December.

During that time we employed over fifty girls, and most of the time seven men. The girls were paid seventy-five cents a day, and the two foreman two dollars each, and the firemen and other help one dollar and a half. This help was divided into two sets of hands, one worked days and the other nights. These girls were nearly all of the farmers' daughters living within a very short distance of the factory, and most of them boarding at home.

The books of the company show that it paid this help \$4,762.41. That there were worked up 22,384 bushels of apples, at a total cost of \$5,101.22, making the small sum of \$9,863.63 paid to the farmers and their families in less than four months, and that all within a very short distance around us, perhaps the farthest being not over four miles away.

That amount paid for apples was for a product that must of necessity have been a total loss, or nearly so, had it not been for the factory. Had our factory had the capacity to have consumed fifty times the amount it did we could have supplied it at the same price. Not having the room to store more than three to five thousand bushels at a time, we were obliged to stop when the weather became so cold that apples could not be moved. Our fuel cost us \$585, or nearly that amount. The exact amount of wood used daily I could not get at in the haste in which I was obliged to prepare this, as our superintendent furnished me only the aggregate cost, as above. We manufactured and put up ready for market about 130,000 pounds of the preserved apple in round numbers.

As to the sale of this product and the profit to the manufacturers, I deem I am not called upon to testify, for it is the value to the farmers that I feel that I am to show, and will only say that I hope it will be as remunerative to them as it has been to the farmers. The least I can say is that it is an enterprise that would be sadly missed in the township of Palmyra where it is located, and as a farmer interested in all that pertains to that most noble of all professions, I can conscientiously say there *is* value to the farmers of Hillsdale in the Alden process as well as any other process that will bring to your doors a market for bulky and perishable products of your farms, that must otherwise become a burden rather than a profit.

Had the company of which I have been speaking known one year ago its

capacity and "strength to save" that it now knows, it might have utilized thousands of bushels of potatoes, that really made their owners worse off than those who had none. We were then young in the business, and had not learned that by the Alden process potatoes could be preserved in perfect state for any length of time, and for any climate in the world. Such, however, is the fact, and to-day the government of the United States is calling for all that can be had for the use of the navy, and I believe it is no fanciful dream, that the time is not far ahead when the mariner can sit down to a meal of as fresh and wholesome vegetables as any one of us can to-day, though he be in mid-ocean or on the coasts of the far-off islands.

Dr. O. Palmer read the following essay on

"BOOK-KEEPING ON THE FARM."

That something like order or system in every department of business is demanded in order to furnish any assurance of success, is a statement with which but few, if any, will be likely to take issue. There are but few departments of business or of industry that will be likely to realize more from a strict adherence to system than that of the farmer, and no system can be completely followed without a careful record of the events connected with it. No memory is certain enough to be trusted to a sufficient extent to dispense with books of record of matters pertaining to the farm any more than the banker, merchant, or manufacturer can trust his memory to take care of his business. A distrust of what they sneeringly term "book farming" is felt by a large number of farmers, merely because they do not understand it, and do not, therefore, appreciate its importance or advantages. They say they do not understand book-keeping, and for that reason could not, if they would, keep accounts with their farm. This is a mistaken idea, for any man with sense enough to plow a straight furrow, who can read and write, and who understands the fundamental principles of arithmetic, can keep books, and keep them correctly if he has the mind to do it. I do not believe there are five farmers in Hillsdale county but would know enough to charge John Smith with forty bushels of wheat which he had sold him, and to credit him with one hundred bushels of corn when it was brought to pay for it two months later; and the whole system of keeping books of account is just as simple as the record of this transaction. For a farmer who has no experience in theoretical book-keeping, I would not advise at first that he begin with a complicated form, but a simple set of accounts that a child can easily understand, and which, if followed, will grow year by year until he will be able by simply referring to his books to give you the exact profit or loss of any crop or field, or herd or animal he may have. I will give in as brief a manner as possible my idea of a simple form of farm accounts, but first let me say that an indispensable adjunct to the beginning and carrying out of the programme, is to have writing materials and your books convenient for use; for if after using they are to be packed away in a drawer in a closet or bedroom, or some out of the way place, you might as well not begin, for ninety-nine out of every one hundred of us would not go after them one day in ten after a hard day's work; but if you have a secretary or desk in your living room, so they are close at hand when you come in in the evening and have removed your boots, it will be part of your enjoyment and rest to open your book and enter the proper record of the day; but if you have neither secretary or desk, put up a neat bracket shelf, which you can do in an hour the first rainy day, and have them ever ready for use. For this form of accounts I should use but one book,

ruled in ledger form, so that both debit and credit of each account would be on one page, and the balance would be always before me. The first would be "Farm Account," the same that the merchant or manufacturer would call "Stock Account." On opening my books, this would show the cost of my farm, stock, tools, and everything belonging to the business, in short, a complete invoice of my farm property, and to this would be added from time to time whatever was bought, and opposite what was sold. This account alone would be a great aid to the average farmer as it would show him the total profit or loss at the end of each year; but it is not enough, for some parts of his work may yield him a profit, and other parts incur a loss, and it should be his aim to know the exact result in each department, so that future losses may be avoided and gains increased. I would therefore make a map of my farm, naming or numbering each field, and open an account with each the same as though it were a neighbor, charging it with the cost of labor expended on it and the cost of seed, and giving it credit for what it paid me back, and also an account with my dairy cattle, my stock cattle and teams, my sheep and hogs, and my fowls. To be perfectly exact in these accounts scales would be necessary, but without them a farmer can estimate very nearly, and all estimates should be made with the balance, if any, against you, so that the disappointments when they come will be happily in your favor. These with a cash account will be all that is necessary, and at the end of the year each one is balanced into the farm account, and you know just how much you have made or lost and can tell just where your losses have occurred, on what crops or stock your gains have been made, which knowledge will guide you in making your plans for the next year. In the same book, or another kept for the purpose, I would advise that a memorandum be kept of items of interest, and especially of variations in the market, as certain products almost ever bring larger prices at certain seasons than at others, and by carefully watching and noting these variations you can, in a few years, know almost to a certainty what time to expect the most from a disposal of your products. As your experience will tell you of the mistakes you must expect to make at first, so will it also point out to you wherein you may advantageously open new accounts. One thing you will find absolutely necessary to your success as an accountant, and that is to promptly attend to it. Make it a duty at first as regularly as you eat your supper, and it will soon become to you a necessary part of your work and pleasure.

I have thus endeavored to give you briefly my idea of such accounts as are absolutely essential to success, and hope the time is near at hand when every farmer will consider it as much a part of his business to keep books as it is to plow his land, or sow his seed, or harvest his crop.

DISCUSSION.

Mr. Mann, of Adrian, thought it a good plan for farmers to have their children keep their farm accounts for them.

Mr. Drake, of Amboy, thought the diary the most convenient book for farmers to keep their daily accounts in, and then they could be transferred at the leisure of the farmer.

Pres. Abbot thought that in keeping an account with each field the best mode would be to keep the account open through the whole rotation of crops, as it would not be fair to charge manure to a single crop.

Mr. R. W. Freeman, of Litchfield, read a short paper on "Farm Management," after which Mr. A. Hewitt, of Allen, read the following paper on

SHEEP HUSBANDRY.

Entertaining, as I do, a high regard for the educational interest of all classes of society, I am especially gratified with any and all efforts that tend to enlighten the practical farmer. I am glad to meet you at this time and to be privileged with speaking for a few moments upon a subject of considerable importance to the farmers of this locality, namely, sheep husbandry. Sheep have justly held a noted place in the estimation of shepherds and flock-masters in all ages of the world; but my purpose on this occasion is to speak in relation to the kinds with which we are most familiar, and to draw a few inferences with regard to their origin and introduction into this country; the treatment and care they should receive at our hands; their general usefulness; their value as compared with other stock, and the kinds best adapted for the farmers of this locality.

Various breeds of sheep must have been brought to this country by our ancestors in the settlement of this continent, which have been promiscuously mixed together, and are now distinguished from the later importations of improved varieties as natives. These sheep were usually kept in small flocks, requiring but little care except folding them at night to protect them from the ravages of wild beasts. Within the last half-century, and more particularly within the last twenty-five years, they have been more or less mixed with others of purer blood, thereby producing what are familiarly known as grades. With these crosses the native sheep of the country have been much improved in form and wool-producing qualities, increasing their fleeces from an average weight of two and one-half or three pounds to an average of five or six pounds.

It was from the wool of these native sheep that our grandmothers and mothers spun and wove the cloth for the family clothing. Many people of the present day can distinctly recollect the manner in which this work was carried on. The buzz of the spinning-wheel and the clanking of the old hand-loom have made many lasting impressions.

From time immemorial sheep have been bred in Spain, and from that country have gone out originally the different families of fine wools under the names of Saxon, French, and Spanish merinos. Over a century ago quite a flock of merinos were taken from Spain into Saxony. They were regularly housed and fed, and from continued pampering in the course of time became small in size, feeble in constitution, and very tender, yielding only a small quantity of wool, but of an uncommonly high order. They were introduced into the United States about fifty years ago, and quite a number of flock-masters took hold of the business of raising these little fine sheep, with the expectation that they would be amply rewarded from the high price of their wool; but it was produced only with too much labor and in quantities too small to render the business remunerative, especially when put in competition with wools from other sheep of an improved character, and that produced fleeces nearly double in weight and of a fair quality. The Saxons gave way under these circumstances, and are now pretty generally discarded in this country. The French merinoes also had their origin in Spain, and were taken to France nearly a hundred years ago, where they were bred by the French government with great care. The original flock was made up from some of the choicest sheep of the different families of Spain; they were very dissimilar at first, but by uniting their individual differences, and being bred for a special purpose for a long period of time, a new family of merinos was produced, and distinguished as the French. They were imported into the United States by D. C. Collins, of Hartford,

Conn., in 1840, and soon after by other distinguished gentlemen. Mr. John D. Patterson, of Westfield, N. Y., was a breeder of these sheep, and sold quite extensively to farmers in this and other Western States. A distinguishing characteristic of this variety was their great size, yielding large fleeces of a fair quality when highly fed and otherwise given the very best of care. Several gentlemen of this county, among whom were John Keagle, of Allen; Z. B. Stilson, of Reading, and L. J. Thompson, of Hillsdale township, kept more or less of these sheep, and exhibited some grand specimens on their farms and at our agricultural fairs; but these men were their own shepherds, giving their flocks such treatment that they could not do otherwise than well under their care, but when taken in charge by others who were inexperienced and negligent, they rapidly declined. They were not sufficiently hardy to endure the cold weather of this climate under the limited care usually given to sheep by the great mass of farmers in this country, consequently they are giving place to other breeds of fine-wooled sheep, formerly known as the Spanish, but now in this country as the American merinos.

Early in the present century, and from time to time more recently, sheep have been introduced into the United States from Spain, representing several families under the names of Infantados, Paulers, Silecians, etc. As early as the year 1813 Stephen Atwood, of Woodbury, Conn., commenced a flock and bred them purely of the Infantado division. He was succeeded by the late Edwin Hammond, of Middlebury, Vt., and several other gentlemen of that State. Under their supervision, and especially that of Mr. Hammond, who had in his mind a model of what he wished to produce, and who worked hard and long to obtain it,—breeding invariably for the accomplishment of his purpose,—succeeded in converting the comparatively light-boned and imperfectly developed sheep into heavy, well-formed, short-legged, strongly constituted sheep, with compact fleeces of increased weight and good quality. Hon. Charles Rich, of Shoreham, Vt., commenced a flock in 1823 of the Pauler family. They have been bred within that division by the original founder and his sons for many years in Vermont, with but little admixture of other blood. They are snugly built, with good constitutions, and very hardy, with fleeces of good quality and quantity. At a period still later,—1851,—William Chamberlain, of Red Hook, N. Y., established a flock known as the Silesians, which also were formerly from Spain, were taken to Silesia and thence to the United States. From what I can learn of them they are not as well adapted to hardships and short keeping as the Paulers, although they are larger and yield a finer quality of wool. The great number of fine-wooled sheep now in the United States is made up to a great extent from the descendants of the flocks above mentioned, which are rapidly increasing in numbers from year to year, and large droves are working westward to feed upon the extensive plains of that region.

The long-wooled sheep, of which there are several varieties, had their origin, so far as I know, in England and Scotland. They have been kept quite extensively in Canada and the United States, and they are not usually herded in as large flocks as the merinos are. The improved Leicester and the Cotswold are among the most important, and are furnishing the combing and delaine wools which of late years are finding a ready market at paying prices.

The Southdowns also claim a share of our attention. They are short or middle-wooled sheep, and are among the best as a mutton-producing variety, being hardier, and show a disposition to fatten even on ordinary feed.

The treatment and care of sheep have been, according to circumstances, under

the wisdom or foolishness or neglect of their owners. Some have been over-fed, and kept in warm stables and pampered until they have become very tender and debilitated; others, and by far too great a number, have been too much neglected, and consequently brought but small profits to their owners. The medium course between these extremes is the proper one to pursue. They should receive at all seasons of the year a sufficient quantity of wholesome food to keep them in good condition. In the summer they should be frequently changed from one locality on the farm to another; they should not be kept too long on the summer-fallow, but removed as soon as the briars and weeds are nipped off; short feed is better than overgrown, rank herbage of any kind; salt is essential, and should be given them as often as once a week. They always seem to prefer the feed grown on high and dry land; do not thrive well on low, marshy ground. Will frequently drink if pure water is accessible, but will get along better than cattle or horses without it. Sheep should have their feet trimmed once or twice during the year, if they require it, and the merinos will; other kinds do not usually need any care in this direction. A few drops of tar placed in cavities around the horns of merino rams will prevent the flies from doing their work, which will surely prove fatal to the sheep if not attended to without delay. It is well to shelter all sheep from the chilling storms of autumn and winter, but should not be too closely confined. Their stables require to be well ventilated and littered with straw. It is well to feed them once a day, at some distance from the barn, in order to give them exercise and at the same time give the stables a good airing. No stock should ever be compelled to breathe impure air or drink filthy water. It is as deleterious to their well-being as it is to the human family. Good hay made from clover and timothy grass, cut before it becomes too ripe, and properly cured, makes excellent food for all kinds of sheep. This, in connection with a very little oats and shorts mixed together, or occasionally a few roots, will keep them in good condition. Corn may be given to sheep intended for the butcher, but for breeding ewes given in any considerable quantities is not as good as lighter feed. Lambs from ewes kept in stables and highly fed are generally weak and inactive. If there be hay and corn fodder and straw designed for the winter feed, it is well to give them a foddering of each daily, not keeping them exclusively on corn fodder for six or eight weeks, and then on hay or straw. Great care should be taken to prevent chaff and hay seed from getting into the wool. Hay or straw should never be dropped from a stack or mow upon the backs of sheep. If necessary to catch one, do it by gently grasping the hind leg, or by placing the hands around under the neck. Never, under any circumstances, hold them by their wool. A little care with regard to these things will prevent future inconvenience and trouble. Every farmer should have a standard of excellence of what he deems to be the most profitable sheep for him to raise, and this standard should have reference to the ample capacity for lungs and digestive organs, general hardiness, size, form and wool-producing qualities; and if there be any in the flock that do not come up to it, they should be drawn out and fattened for the butcher, or otherwise disposed of. Better sell them for what their pelts are worth than continue to breed from inferior animals. And if there be any with fleeces saturated with oily, gummy substances, and of light carcasses, that are badly pinched up in cold, wet weather, be sure and draw them out. A superabundance of oil is always at the expense of the constitution and of cleansed wool. If farmers would be more particular in selecting breeding stock we would see a better class of sheep in the country, that would well pay for all the extra

labor. Those of us who in an early day of merino sheep speculation in this State ventured to invest, know something of the conduct of speculators by dealing with them,—in many cases having paid pretty dearly for our information,—for while many good and valuable sheep were sent to Michigan from the New England States and from the State of New York, thousands of inferior ones have been fixed for the western market by pampering and painting and stubble-shearing, and have been hawked about the country by unscrupulous speculators, victimizing those who put confidence in their highly-wrought stories. These things were discouraging, but are now outgrown by those who have persevered with a fixedness of purpose in the enterprise.

I must say a few words about sheep with regard to their comparative value with other farm stock. With us a mixed husbandry is the prevailing order of things. I would not change it if I could, and could not if I would. Situated as we are with a soil adapted to the production of all kinds of grain and vegetables, the grasses in abundance, with the dairying business successful in many localities of the county, the fruit interest continually becoming more and more important, and our suitable adaptation to the production of good cattle and horses, it would be the height of folly to advocate one distinct husbandry at the exclusion and sacrifice of all others. We must have our bread, beef, pork, our butter and cheese, poultry and fruit, for home consumption at least. But while I advocate mixed husbandry as a rule, there are preferences among farmers with regard to the kind of stock most profitable for them to keep, which is very proper, for while one man can see certain success in the future from breeding good horses, another can see it much more clearly in the production of good cattle. The man who would go aside to kick a sheep has no business with the care of that inoffensive animal. Sheep give quicker returns than cattle or horses. Suppose, for illustration, that a farmer pays \$4 per head for twenty-five good sheep soon after shearing, consisting principally of grade merino ewes and full-blood rams—\$100; and that he also pays the same sum for four steers, say fifteen months old, and keeps them on his farm for a period of two years and three months. Now at the end of the first year his sheep will produce six pounds per head—150 pounds of wool—and that at forty cents per pound, which is below the average price for the last twenty years, would be \$50, and during the next three months he sells the increase, or a part of the original stock and a part of the lambs, as he shall deem best, say fifteen in number, at \$3 per head, which would be \$45; this, added to the \$60 received for wool, makes \$105. Continue the experiment another year, with the same result, and we have \$210 received for wool and sheep sold, and the original stock worth \$100—altogether \$310. Now the steers are three and one-half years old, and we will estimate them at 1,300 pounds each, at five cents per pound, or \$65 per head, making for the four \$260, or \$50 in favor of the sheep, allowing the interest on the \$105 first received to pay for shearing, tagging, etc. The question I leave for solution is, which has cost the most in time and feed, the twenty-five sheep or the four steers? Never having demonstrated an experiment of the kind myself, am unable to say, but from general knowledge and observation should think them about equal. Another point in favor of sheep is they do not usually die in debt to the farmer, for we see from above calculations that they are a sort of pay-as-you-go investment, which system ought to have a prominent place in all business transactions.

In this county we recognize two distinct classes of sheep,—the fine wools and the long or combing-wools. The former have greatly the advantage in num-

bers, and both are valuable for wool and mutton. When wool is the first consideration, the fine-wools, in my judgment, have the preference; but when mutton is the object sought, from the early maturity and larger growth of the long-wools, they may take the front rank. Each is meritorious and entitled to the attention of the farming community.

I wish to say a few words at this time in reference to the practice of washing sheep, and to enter my protest against it. I acknowledge that I have heretofore washed my sheep, in view of the fact that the one-third rule of shrinkage on all unwashed fleeces did not give me what I would be entitled to for my wool if unwashed. When wool shall be bought strictly upon its merits, as other commodities are, and the producer and manufacturer come to understand each other, with a mutual regard for the interests of both, and competent agents are employed that can and will distinguish and compare the relative value of all wool, whatever its condition may be, with a fixed standard of wool, then the washing process will no longer be deemed a necessity. All wools, however well washed, go through a scouring process by the manufacturer. There are various reasons for discarding the washing theory. If done early in May it endangers the health of man and beast from the cold state of the water at that time. If put off till the first of June it brings the shearing too late, for usually from fifteen to twenty days' time needs elapse between the time of washing and shearing, that the wool may become lubricated with the animal oil, giving it the luster and brilliancy desirable, and to make it weigh well withal. The poor animals are thus compelled to carry their heavy fleeces in the month of June, to their great inconvenience, and then in turn to suffer for want of a portion of it in early winter. With the same propriety a man might wear his flannels, and overcoat well buttoned up, in the hot weather of June, and then stick to his cotton or linen garments in frosty weather in the month of November. The wool on fashionably bred merino ewes of the present day, with wrinkles, folds, and flanges about the tail and back part of the thighs, though tagged and washed with the greatest care, will frequently, in the warm, wet weather of June, become tainted, and flies are induced to deposit their eggs, from which great inconvenience and trouble arise. Sheep thus besieged must be attended to at once. They can be distinguished from others of the flock by their repeated though ineffectual efforts to dislodge their tormentors, which have taken refuge under the thick wool and between the wrinkles. Sheep sheared early in the season will take care of themselves in this respect. This is not all. Healthy sheep are exposed to contagious diseases by being yarded where affected ones have been, and again injuries are frequent, especially if handled by inexperienced workmen; and still another reason for abandoning the practice is the fact that sheep are often driven one or two miles over dusty roads with their wool wet, to which the dust readily adheres. But what if it does, they have been washed, and the wool-buyer must distinctly understand it. Sheep should be well tagged before let out to grass in the spring; should be sheared in the month of May; should be housed for a few nights and then turned away to pasture, and in a few week's time will be in a much better condition than if compelled to carry their fleeces to the middle or last of June. The difference in value per pound between wool thus handled and that washed and treated as above described is very slight. I trust the time is not far distant when all interested in these matters will see things in their true light.

With regard to the general usefulness of the class of domestic animals under consideration but little need be said, as it is pretty well known that they fur-

nish the material from which millions of human beings are clothed during a considerable portion of the year. All nations outside the torrid zone are dependent upon them. Their flesh also furnishes a vast multitude with wholesome food, and the shepherd's vocation is a happy one.

I notice that the Executive Board of the State Agricultural Society, at its meeting recently held at Jackson, made provision for a thorough-bred class of sheep to be shown at our State fairs. This movement, in connection with the agitated question of establishing a merino sheep breeding register, will have a tendency to induce breeders to look well to the origin of their breeding stock.

It is a question with me whether or not the sheep-breeders and wool-growers of Michigan are doing as much as they might to carry forward the work of this branch of our united industries. Other States around us have their wool-growers' and sheep-breeders' associations, and claim to profit by them. Could not the farmers of our State, if properly organized, do as well? I would be happy at any time to coöperate with my fellow farmers in any feasible plan that might be introduced for the advancement of correct principles in sheep breeding and wool-growing in our great and prosperous State.

AFTERNOON SESSION.

This session opened with an address on "Wheat Culture," by Prof. C. L. Ingersoll. See lectures and addresses following these reports of institutes.

Next a paper by Mr. Fred Curtis, of Wheatland, on "Improved Breeds of Cattle." Manuscript not furnished.

Mr. C. R. Coryell, of Allen, read the following paper on

"THE BEST COW FOR THE FARMER."

In a brief essay of a few minutes I can only notice some of the fixed and leading characteristics of the prominent dairy thoroughbreds of the country. To these the farmer of this country must look to improve the milking capacity of his native stock by raising grades.

Before proceeding to notice the different breeds of dairy cattle we will notice the composition of milk:

Milk of average good quality contains,—water, 87.40; butter, 3.43; casein, 3.12; milk sugar, 5.12; mineral water, .93, in 100 parts. Milk varies in its composition in different cows, at different seasons, or when fed upon different kinds of food, the greatest variation either of its solid constituents being butter. Newly-drawn milk, when viewed under a microscope with a magnifying power of 300 diameter or more, exhibits minute globular or egg-shaped atoms of unequal size floating mechanically in the watery mass, whitening every part with their presence, and varying from 1-1500 to 1-4000 of an inch in diameter. These are the butter globules.

The butter globules are enclosed in pellicles or sacks, and are composed of white and yellow fats and several kinds of volatile oils, all mingled together. The fatty matter which enters into the composition of these butter globules consists of four varieties. The hardest is stearine, which when separated is a hard, white, flaky-appearing fat. The second in consistency is palmitine, and

resembles palm oil, and contains most of the coloring matter of butter. The third is oleine, from its thin, oily consistency. The fourth consists of the essential oils of the food of the cow, and which are probably as numerous as the varieties of food she consumes. The specific gravity is about 94, water being 100. These butter globules vary in the different breeds, and somewhat in different cows in the same breed, and in the same cow. A dairyman, by examining milk with a microscope, can tell, by the butter globules, whether a cow is adapted to his wants. If the globules are large, plump, and uniform, the cream rises quickly and churns easily. If they are small and varying, it rises slowly, churns hard and is better adapted to cheese-making or marketing than to butter-making.

The milk of the Jersey cow is not adapted to marketing, as the motion in carrying would break the membranous covering of the globules and form butter; neither is it adapted to cheese-making. The dairy cow is the production of the art of man, and is fitted for her artificial surroundings, and her purpose as a great food producer. What cow is best, depends on where and what she is wanted for. If a single cow or a few cows are wanted to furnish milk and butter for family use, there is none better than the Jersey. Their milk and butter are exceedingly rich and delicious and possess an aroma that no others do, and the butter stands up well under the heat of summer. The Jerseys came from a group of rough, rocky islands in the channel between England and France. The pastures there are short, succulent, scanty, but very nutritious, and in that damp, mild climate the feed extends through most of the year. The Jerseys are small in size, with deer-like heads, thin neck, high shoulders, hollow back, large belly, and a clean, good-sized udder. The prime object in the breeding of the Jersey was the production of cream and butter. Having succeeded in this purpose, they were content with an ill-flavored animal, with flat sides, flat between ribs and hips, cat-hammed, with high hips and hollow back. They could the better appreciate her fawn-like head, large, soft eyes, neatly crumpled horn, small ear, yellow within, and her capacious udder. The quantity of milk given is much less than that of other dairy stock. The average production of cream from the milk of an ordinary cow is $12\frac{1}{2}$ per cent.; that of the Jerseys produces from 20 to 25 per cent. The butter globules of the milk of the Jersey are large and nearly uniform in size, causing them to rise quickly. The globules are from 1-1500 to 1-2000 of an inch in diameter, and the largest of any breed. The average Jersey, well fed, will give five times her weight in milk in a year. She is emphatically a butter cow, and though so small, as said by our worthy chairman, that "we could put her in a cupboard," we have very remarkable yields of butter recorded, and well authenticated. Mr. J. H. Sutliff's cow Pansy, that produced 574 lbs. of butter in a year; and Motley's cow Flora, that produced 511 pounds. The average weight of the Jersey is from 800 to 900 lbs., and she will give from eight to twelve quarts of milk per day, and from seven to ten quarts of milk will make a pound of butter. An experiment was recently tried to ascertain how many quarts of milk it would take for a pound of butter. It required eleven quarts of the native, eight and one-fourth of a grade Jersey, and six and one-third quarts of the Jersey. The objections urged against the Jerseys are, the small size, moderate measure of milk, and their want of hardiness to endure the rigors of our climate.

The best cow for a farmer who wishes to make cheese, or butter and cheese, or to supply milk for sale, is the

Ayrshire.

"The Ayrshire," says Warring (and by the way, Warring is a Jersey man all over), "is par excellence the milkman's cow. She is rather small, perfectly formed, well developed in every point that tends to the production of large quantities of milk, and of that delicacy of organization which invariably accompanies the production of rich milk, and whether the business be the sale of milk or the manufacture of cheese, she leads the list of the pure breeds, while for butter she is hardly, if at all, inferior to any other in the quantity produced. Were it required that we should lose from our dairy farms all but one breed of cattle, the Ayrshire should by all means be the one retained, for although a large eater, she converts her feed into milk more completely than does any other animal." An average herd of Ayrshires fairly fed and cared for may be expected to give six times their weight of milk in a year. No other breed will make so good a return. They were developed on the poor soil of Ayre, in Scotland, yielding a scanty pasturage, which makes them all the more valuable for us as easy keepers. The Ayrshire is well adapted to cheese making. The butter globules are abundant, but unequal in size, varying from 1-1500 to 1-4000 of an inch in diameter, requiring a long time for all the cream to rise, and calling for skill in churning to get all the butter. It takes from twenty to twenty-five quarts of milk to make a pound of butter.

The Ayrshire "Georgia," owned by Sturtevant Bros., Massachusetts, weight 1,080, gave, in the year 1874, 8,271 pounds of milk, or nearly eight times her weight.

The average weight of the Ayrshire cow is from 950 to 1,050 pounds.

"The Ayrshire cow," says Sturtevant, "is an expression of the will of the Scotch people, and her peculiar adaptation to the wants of that people, shows the intensity of the purpose which impelled them in her production. She is admirably adapted to a country of uneven surface, and scant, uncertain pasturage. She is a good feeder, eats much, but of what she eats she requires but a small part for her own support, and secretes the greater part in milk."

The objections urged by some against this breed are the moderate size, small, short teats, a great tendency to nervousness, and a suspected weakness of constitution. They are not esteemed as beef makers, but they fatten readily when dry, but their beef is inferior to the short-horns or Devons.

The best cow for the farmer who has plenty of good, rich food, and the object is to milk awhile and then convert into beef, is the

Short-Horn.

The short-horns, while they are the largest of all the bovine races, are sometimes the greatest milkers. It is doubtful if there has ever been any better milking stock than the original short-horns, and they still have a persistent tendency to transmit that quality to their descendants. Mr. Allen says the original were the greatest milkers in quantity of any breed except the Dutch. He says there are numerous well authenticated instances of their giving eight or nine gallons of milk per day on grass alone.

Hon. Harris Lewis, of Herkimer county, New York, has a herd of twenty short-horns, mostly of the Princess family, and eight or ten selected native cows. He finds that his short-horn cows yield more and richer milk than the best native cows he could select. His dairy averaged 251 pounds of butter to the cow in 1875, besides selling \$50 worth of milk at the farm. Again, some cows in certain families that have long been bred for beef and beauty, fail to give

milk enough to support a calf, and now and then one gives no milk at all. Beef and beauty are the all-essentials in the eyes of nine-tenths of the modern breeders of short-horns. The butter globules are about from 1-2000 to 1-2500 of an inch in diameter, and of uniform size, causing the cream to rise rapidly and churn easily, but is not unusually high colored. The milk averages about sixteen per cent. cream, and is good for butter, cheese, and for marketing. The average weight of a cow is 1,500 pounds. The main objections urged by dairymen against this breed is a tendency to convert food into fat and flesh rather than into milk.

The Dutch or Holstein, supposed to have entered largely into the formation of the short-horns, are very large milkers. I quote from Prof. Arnold: "They possess large frames and vigorous constitutions, derived from the rich feed of a generous soil for successive generations. Average weight about 1,500 pounds, yielding an annual flow of milk of from three and one-half to four times their weight. The milk is rich in casein, and fairly so in butter. The butter globules in their milk are very abundant and uniform in size, but small, and are better adapted to cheese-making and marketing than butter-making. The butter stands up well against heat, and is good for long keeping. The uniform smallness of the butter globules in their milk, though they make the cream rise slowly, are a positive advantage in milk for marketing or cheese-making."

Mr. Garrit S. Miller, of Peterborough, New York, has three imported Holstein cows that have given an average of 8,738 pounds of milk per year for the six years that he has owned them. Crown Princess was in milk 1,821 days, and produced 61,112 pounds,—a daily average of 33.56 pounds. The highest daily yield was seventy-six pounds; her largest annual yield was 14,027 pounds.

Maid of Twisk, the property of the Unadilla valley breeders' association, gave in 1876, in 192 days, 9,653 lbs. of milk, and in 211 days ending December 8, 1876, gave 10,349 lbs.

Frequently large yields of milk are obtained from native cows, but they, like the short-horns, are uncertain. From the famous Oaks cow was made 476 lbs. of butter in one year, the cow Catskill about as much, and the Vermont cow made 504 pounds in a year; they were natives.

The number of cows in the United States in 1870 was about nine millions. Probably there are now not far from ten millions. Of these there are estimated to be about one hundred thousand thoroughbreds, and about one million thoroughbreds and grades. So the common farmer must of necessity depend upon natives for a large share of his cows. The large annual demand for dairy cattle must be supplied from every and all sources. There are certain external indications of the capacity for producing milk which are apparent to the dairyman who is in the habit of filling up his dairy, and he soon becomes so expert as to be seldom deceived.

A Fine Cow.

Mr. Mueller, the American Consul at Amsterdam, gives the Dutch idea of a fine cow as follows:

"A '*beste keo*' must show a finely moulded head; large nostrils; thin, transparent horns; a clear, bright eye; purely red lachrymal glands; a kind, mild countenance; blue nose; thin neck; free respiration; fine bones; well formed body, with rather broad hind parts; straight back; long, thin tail; round but moderately bent ribs; developed belly; stout, yet not heavy legs; smooth joints; thin, mellow, movable skin; soft hair; delicately haired, broad and drooping

udder; four well formed, dark colored teats; well developed milk and blood vessels; vessels on the belly and about the udder to be proportionately broad and vigorous, and of a wen-like swell, and the vessels of the udder and inner hams to be spread net-like; the opening through which the milk and blood vessels enter the body to be large and roomy. A cow thus formed is also apt to show a perfect escutcheon."

The common farmer must of necessity, for the present, depend upon natives for a large share of his stock. By selecting his best cows, and resorting to thoroughbred males whose valuable propensities have become permanently established for generations, by breeding for these particular qualities, he can obtain a herd that is nearly as good as the thoroughbreds for all practical purpose, at a very little cost.

There is no way in which the milk producer can so readily, cheaply, and safely recruit his dairy as by using the thoroughbred male. Prof. Arnold says: "We have, as a rule, found grades to be better milkers than either side of the ancestors from which they have descended." S. D. Hungerford, of Adams. N. Y., had a grade Ayrshire that gave 302 pounds of milk in three days; and Joseph Percival, of Waterville, Me., had two Jersey grades whose milk made 965 pounds of butter in one year.

When Ayrshires are crossed on the common stock or with cows having more or less short-horn blood, the grades are generally good milkers, and the objection urged against the breed are modified. Many of our best dairymen insist that a high grade short-horn cow bred to a thoroughbred Ayrshire, gives the best results, and is to be preferred to the thoroughbred Ayrshire for the dairy.

Jerseys crossed on deep milkers of our native stock or grade short-horns, give good satisfaction in our butter dairies, and are coming more and more into use.

A cross of Ayrshire and Jersey has not been successful in Scotland, the result in both ways having been to produce a progeny having the inferior points of both breeds. The butter globules in the Jersey milk are the largest, and those in the Ayrshire milk are small. These two types of milk should not be mingled in the same herd, and it is better to have one or the other type in the same factory.

The grades resulting from crossing the short-horns on good native cows have a great tendency to milk, are of good size and fatten readily, and perhaps for the farmer of this county who follows mixed husbandry, make the best cow.

If the farmers of Hillsdale county would take more pains in selecting and retaining their best cows and breeding from thoroughbred males, of whatever breed suited to their business, the resulting stock would be increased fifty per cent. in three years.

The following is an abstract of an address by Dr. A. F. Whelan on the

"HYGIENE OF DOMESTIC ANIMALS."

I regret to say that my remarks are not reduced to writing. I will indulge in only a few moments' talk on this familiar subject. I have been unable to write an address for this occasion on account of press of business.

This is a farmers' meeting, and in a meeting of farmers my mind goes back thirty-five years to the time when I was a boy upon a farm in Western New York. I have done many hard days' work on a farm, under a master who practiced farming scientifically. I took an interest in, and studied this subject then.

Hygiene is defined as that branch of medicine which relates to the preserva-

tion and highest standard of health. This is a broad subject, much too broad for the time I shall occupy. It has been the policy of all nations to protect the lives and health of their subjects, and no laws are better guarded than those that relate to the health of citizens. All things are made subservient to health. This has been a subject of great study with reference to the protection of the army, the navy, and everything that relates to a civilized country. This is a matter of importance as applied to domestic animals. Most animals are raised for profit. Their health is important both to the producer for profit and to the consumer. No manner of feeding can produce health in an animal that springs from unhealthy parentage. Animals inherit ills and tendencies to disease the same as do human beings. If you would have a healthy pig, you must get one of healthy parentage. Measles, scrofula, etc., in hogs are handed down to the young. If you have an unhealthy sow, knock her in the head; don't make a breeder of her. Don't make a breed mare of a spavined, ring-boned, broken-down old plug. I know in this county a family of horses that are all ring-boned and spavined horses. I know their family; they came from a spavined and ring-boned ancestry. Disease is handed down from either side.

The Arab does not keep the pedigree of the male horse; their pedigrees are all on the side of the mare. The mare that is all covered with blemishes should be disposed of, and the best way to dispose of her is with the rifle.

It is no wonder that the short-horn cattle have lost their milking qualities. They have not been bred with a view of keeping up the flow of milk. They have been bred for beauty and size for ages.

The buffalo is bred by nature, it is true; but the weak are devoured by the wolves, and their increase is only from the healthy, and that is the reason they are healthy.

Color in cattle is also bred, as discovered as early as the time when Jacob herded cattle for the spotted increase, and finally owned the whole herd, as we read in the scriptures. If health and color can be bred, how much more can we propagate disease? Don't breed from unhealthy cows. It may not show in the first nor the second generation, but by and by it will crop out. Like the saying that we hear, if there is African blood it may not show for generations, but by and by "out pops a nigger." I mean no reflection, but it illustrates the point. It is true that certain crosses will produce better results; hence the importance of a healthy foundation in stock raising. The puny cannot breed healthy stock. Poultry can be entirely changed in color and size in fifteen years' breeding. If you do not select the healthiest fowls, you will see dwarfs and runtlings in three generations. I could illustrate by relating an experiment if I had time.

The Arabian horse was much improved by crossing with the English horse, and the result is a horse that far excels it in both speed and power of endurance, and now the Arabian horse is not to be compared with the English and American horses. Proper attention to the young is of great importance. Of all young, the human is the most dependent. Domestic animals require less care, but there are certain things that must be observed by the raiser. This care gives results in the permanent health of the animal. The young animal should not be allowed to get chilled. Caution is to be observed in a damp day. Proper care at the outset is a matter of the greatest importance. If you stop the wheels of development while young, you have put a hindrance to it that may last it through life. The young of domestic animals should be fed a little at a time and often. If you feed too much you paralyze the nerves by too great an

extension of the stomach, and you destroy circulation. The system of feeding a young calf a pail full of milk in the morning and another at night is very injurious, because it overloads the stomach, and such overloading hinders digestion and stops the wheels of development.

The fall of the first year is the trying time with the calf. It should be provided with a warm shelter, but while warmth is important it should not be secured at the expense of pure air. The animal must have oxygen; without it you get no growth, nor can you get strength without pure oxygen. Proper food is a matter of great importance with reference to health. The young animal needs food that the old does not. Only the wear of tissue in the mature animal is to be supplied by food, while the growth of the young as well as the wear of the tissue must be provided for. In order to maintain growth there should be warmth with good food and air. Roots are an important food to give growth to the animal, as they contain the alkalies and sugar, and these the young animals must have in order to grow. Common salt is an absolute necessity. No matter how wild an animal is, he will have salt. Nature has provided for the necessities of the animal by putting these alkaline bases in the earth's products. A change of diet is as important for the health and growth of the domestic animal as it is for man.

The story of the farmer who asked the hired man if he liked codfish, and received the reply that he did, furnished codfish for every meal. At first the man ate heartily; but after a time the farmer noticed that he did not eat much, and said to him: "John, I thought you liked codfish?" John replied, "I do like it; but it seems to me it is getting a little monotonous." It is just so with the domestic animals; they need frequent changes in food to thrive well. Give them plenty of fodder, and a great variety of it.

Next to food, and of equal importance, is water. Whatever is held in the stomach, in solution, is absorbed into the system; hence it is important that water should be pure. The cow that gets only poor water, will furnish poor milk, and little of it. Milk is manufactured from what you give the cow.

Next in importance to feed and water is shelter. Shelter is of slight importance on the southwestern prairies, but it is of vast importance here. The theory that stock wintered out of doors has better appetite is abominable. The animal that is sheltered by the lee side of a mullein stalk cannot thrive. It is not the elaborateness of the shelter, but the perfectness of it that is desirable.

Care should be taken in the detection of disease. The old sayings, "An ounce of prevention is worth a pound of cure," "A stitch in time saves nine," etc., are more than true with reference to this subject. An ounce of prevention is worth many pounds of cure, and a stitch in time saves at least nineteen, are better maxims as applied to this subject. The detection of disease requires study of the animal and of its habits, and takes time. You can't tell by the driving of a horse or by the appetite of an animal. A horse may drive promptly and well up to the bit until he drops dead; and an animal may eat well until he breathes his last. The surest way to detect disease is in the temperature of the animal. The temperature never varies more than four or five degrees above or four or five degrees below the normal condition when the animal is in health. Temperature varies from $97\frac{1}{2}^{\circ}$ to 99° in its normal condition, and a variation from that indicates disease. The pulse is an indication. In the horse the pulse in its normal condition is from 40 to 45 or from 45 to 50. The pulse of the sheep is about like that of man. That of the hog varies according to the

breed. A quick-pulsed hog is a nervous, irritable hog, and is of no value except to hunt a hole in the fence.

Medicines given horned cattle should be given in solution. If not given in solution, it goes to the first stomach and there remains, to be chewed over with whatever is in the stomach before it can be taken up by the system. But when given in solution it goes directly to the second and third stomach, and is immediately taken up by the system. But it is different with the horse.

I have not half finished my subject, but I have already occupied more than my allotted time, and must close, subject to your cross-examination.

Mr. Sidney Green, of Pittsford, read the following paper on

“ROAD MAKING.”

The personal and real estate of Hillsdale county, as equalized by the board of supervisors at their October session of 1876, was \$6,389,578. Allowing one day's work for each \$200 of valuation, we have an assessment of 31,948 days' work to be applied to the public highways in the county. An estimate of \$700 to the township, by direct tax, would make an additional amount of \$14,000 for the same purpose. Calling each day's work one dollar, we have the amount of \$45,948 for the improvement of our roads in the county annually. Allowing a road equal to each section line, we have 72 miles of road in a township, or at that rate, say for eighteen townships (including city and villages), 1,296 miles of road in the county. Reducing this to acres, we have 16,368 acres, valued, say, at \$35 per acre, making a total of \$362,880. This amount we may consider as permanently invested in roads for the county, or, in other words, real estate owners surrender that amount to the public for highway purposes. As we are farmers, and have our real estate on our hands, and have our personal property for the improvement of our real estate, it matters not whether it be on our farms or on the highways, the principle is the same. The question arises, how shall we apply our personal resources to our real estate to the best advantage? This, I believe, brings me to the subject of road making, upon which this Institute has rather informally asked me to give my views.

Of course what I have to say will apply more to our partially improved roads than to the opening of new ones. Practically, in my opinion, nearly one-half of our tax, as it is applied, is thrown away, or rather commuted, and not applied at all. I venture the assertion that there is not a farmer here that would be willing to accept fifty per cent. of the time counted on the road, as he would hire and apply to his farm. In making roads the same principle ought to be observed in the use of means as in any other business. The idea and practice of counting the use of a plow or scraper a day on the road and equal with a man or team, is so unequal and unfair it ought to be discontinued at once. I would apply all the means that belong to the highway faithfully. Roads should be made as straight as means and location will permit. In preparing a road bed the main object should be *permanence*. All moderately level ground can be raised by the plow by striking a furrow exactly in the center of the road, and by continuous back-furrowing a very respectable turnpike can be formed at a very little expense. Water courses should be formed on each side of the road bed, so there shall be no standing water in the ditches. It is important that the surface water be confined in the ditches to the natural ravines or water courses, thus avoiding useless and unnecessary sluices. The grading down the high place to form a continuous water course in the ditches after the plowed

turnpike is formed, is often attended with considerable expense. The plow and scraper and perseverance work wonders on such places in a short time, which the road master looks upon with satisfaction. Tile may be used in such places, but the open ditch is preferable, unless quicksand is to be overcome. In preparing the road bed I would use the material nearest at hand. After proper drainage is affected alluvial soil and swamp muck may be used in the road bed with safety. Thorough drainage in such places is all important. A turnpike formed with the material at hand, with a covering of good gravel, makes a much better road, at less expense, than the common practice of carting clay from the banks and dumping it in the mud. The culvert is the indispensable part of a good road, that must not be lost sight of. Economy demands that permanency should be kept constantly in view, for every dollar that is laid out on the road. Our resources are sufficient to commence and construct in a substantial manner.

For common ravine sluices I would use tile that is large enough to let the water pass through without standing against the road banks, the ends being well guarded with stone for water-breaks. These tile should be laid with a good descent, across the road, and sunk to the bottom of the ditch on the upper side. For streams of water I would use stone, being careful to lay the foundation deep in the ground, on a solid foundation. Cut-stone is much preferable, but large square stone, laid in water lime, make a solid and durable abutment. The present cost of such water-passes is much greater than wood, but I think economy in the end. A word on the application of money and road tax to bring about this result: I would barely make the road passable in the district. Then I would make an estimate of how many rods of road bed I could prepare in the way I have indicated with the amount of labor and money I could command for the year. I would commence at one end of the district and *finish* as far as I went. This work should be done the fore part of summer, so that the newly thrown-up dirt would become packed in dry weather. The great bulk of the work should be laid out the fore part of the season, reserving but a few days to keep the road passable. The next season I would commence where I left off with my finished part, and complete another section in the same manner. In repeating this operation from year to year the whole road-bed is put up in good shape for the final covering. This, I would say, is the plan adopted in the district where I live, and it took but a few years to make an excellent road over ground not particularly adapted to that purpose.

I assume now that we have our road-bed raised to its proper height, the ditches formed on the sides, and the sluices and bridges in working order. Now, to make as good a road as the county affords, I would go for the gravel-pit. Fortunate is the road district that has a good bed of gravel on its line. Too much value can hardly be placed on gravel for the surface of our common roads. A covering of from six to ten inches makes a solid surface that will last for years with but little expense for repairing. There are but few districts in the county, I will venture to say, that cannot obtain gravel within three miles. After the road-bed is up in good shape I would apply the great bulk of the district work in hauling gravel from one to three miles for the final finish. I would make estimates of how much road I could cover with gravel each year, then I would finish as far as I went, commencing each succeeding year where I had left off the year previous. It will be found that in a few years the district that pursues this course will have a road up in a condition that will be gratifying to the district as well as the passer-by.

In conclusion I would urge the necessity of working for a special object each

year. It is so pleasing to see a good piece of road constructed over a bad piece of ground. By this way of special working it is much easier to create an interest with those who have the work to do. A want of interest seems to be the great trouble in road-making. We all want good roads, but the want of system and an aimless way of applying our road tax are the bottom reasons for the wretched condition of many of our common roads.

EVENING SESSION.

Mr. Ira Carpenter read the following paper on the

“HORSE’S FOOT AND HOW TO KEEP IT SOUND.”

In describing the various parts which compose the horse’s foot it shall be my endeavor to avoid, as much as possible, all minute anatomical details and scientific technical terms, and to confine myself to a plain description of those parts only a general knowledge of which is essential to the full understanding of what is right and wrong in the formation and application of the horse’s shoe.

The hoof is divided into a horny crust or wall, sole, and frog.

The horny crust is secreted by numerous blood-vessels of that soft, protruding band which encircles the upper edge of the hoof immediately beneath the termination of the hair, and is divided into toe, quarters, heels, and bar. Its texture is insensible, but elastic throughout its whole extent, and yielding to the weight of the horse, allows the horny soul to descend, whereby much inconvenient concussion to the internal parts of the foot is avoided. But if a large portion of the circumference of the foot be fettered by iron and nails it is obvious that that portion at least cannot expand as before, and the beautiful and efficient apparatus for effecting this necessary elasticity, being no longer allowed to act by reason of these restraints, because altered in structure, and the continued operation of the same causes, in the end, circumscribes the elasticity to those parts alone where no nails have been driven, giving rise to a train of consequences destructive to the soundness of the foot, and fatal to the usefulness of the horse.

The toe of the fore foot is the thickest and strongest portion of the hoof, and is in consequence less expansive than any other part, and therefore better calculated to resist the effect of the nails and shoe. The thickness of the horn gradually diminishes towards the quarters and heel, particularly on the inner side of the foot, whereby the power of yielding and expanding to the weight of the horse is proportionably increased, clearly indicating that those parts cannot be nailed to an unyielding bar of iron without a most mischievous interference with the natural functions of the foot. In the hind foot the greatest thickness of horn will be found at the quarters and heels, and not, as in the fore foot, at the toe.

This difference in the thickness of horn is beautifully adapted to the inequality of the weight which each has to sustain, the force with which it is applied, and the portions of the hoof upon which it falls. The toe of the fore foot encounters the combined force and weight of the fore hand and body, and consequently in a state of nature is exposed to considerable wear and tear, and calls for greater strength and substance of horn than is needed by any portion of the

hind foot, where the duty of supporting the hinder parts alone is distributed over the quarters and heels of both sides of the foot.

The bars are continuations of the wall, reflected at the heels towards the center of the foot, where they meet in a point, leaving a triangular space between them for the frog.

The whole inner surface of the horny crust, from the center of the toe to the point where the bars meet, is everywhere lined with innumerable narrow, thin, and projecting horny plates, which extend in a slanting direction from the upper edge of the wall to the line of junction between it and the sole, and possess great elasticity. These projecting plates are the means of greatly extending the surface of attachment of the hoof to the coffin-bone, which is likewise covered by a similar arrangement of projecting plates, but of a highly vascular and sensitive character, and these, dove-tailing with the bony projections above named, constitute a union combining strength and elasticity in a wonderful degree.

The horny sole covers the whole inferior surface of the foot, excepting the frog. In a well formed foot it presents an arched appearance and possesses considerable elasticity, by virtue of which it ascends and descends, as the weight above is either suddenly removed from it or forcibly applied to it. This descending property of the sole calls for our especial consideration in directing the form of the shoe, for, if the shoe be so formed that the horny sole rests upon it, it cannot descend lower; and the sensible sole above, becoming squeezed between the edges of the coffin-bone and the horn, produces inflammation, and perhaps abscess. The effect of this squeezing of the sensible sole is most commonly witnessed at the angle of the inner heel, where the descending heel of the coffin-bone, forcibly pressing the vascular sole upon the horny sole, ruptures a small blood-vessel, and produces what is called a corn, but which is, in fact, a bruise.

The horny frog occupies the greater part of the triangular space between the bars, and extends from the hindmost part of the foot to the center of the sole, just over the point where the bars meet, but is united to them only at their upper edge; the sides remain unattached and separate.

The frog is evidently designed for very important uses, but as our object is purely practical, and not speculative, we will not stop to inquire whether its chief office is to expand the foot and prevent contraction or not, but proceed to consider it in a point of view bearing more usefully on our subject, viz., as the part which offers us the best criterion whereby to judge of the effect of our shoeing upon the foot generally, for no part undergoes so much change from bad shoeing, or exhibits it so soon as the frog. If we carefully observe the form and size of the frog in the foot of a colt of from four to five years old, at its first shoeing, and then note the changes which it undergoes as the shoeings are repeated, we shall soon be convinced that a visible departure from a state of health and nature is taking place. At first it will be found large and full, with considerable elasticity; the cleft, oval in form, open and expanding, with a considerable elasticity; the cleft, oval in form, open and expanding, with a continuous, well defined and somewhat elevated boundary, the bulbs at the heels fully developed, plump and rounded, and the whole mass occupying about one-sixth of the circumference of the foot. By degrees the fullness and elasticity will be observed to have diminished, the bulbs at the heels will shrink and lose their plumpness, the cleft will become narrower, its oval form disappearing, the back part of its boundary give way, and it will dwindle into a narrow crack extending back between the wasted, or perhaps obliterated bulbs, presenting only the

miserable remains of a frog, such as may be seen in the feet of most horses long accustomed to be shod.

There are very few things so little varied in nature as the form of the ground surface of horses feet, for whether the hoof be high heeled and upright, or low heeled and flat, large or small, broad or narrow, the identical form of ground surface is maintained in each, so long as it is left entirely to nature's guidance. The outer quarter, back to the heel, is curved considerably and abruptly outwards, while the inner quarter is carried back in a gradual and easy curve. The advantage of this form is so obvious that it is matter for wonder it should ever be interfered with. The enlarged outer quarter extends the base and increases the hold of the foot upon the ground, while the straighter inner quarter lessens the risk of striking the foot against the opposite leg.

It should surely be our object to retain these valuable qualities as long as we can, and not lightly sacrifice either of them to a false notion of what may be considered a prettier form. Whenever we observe nature steadily persevering in one form, or one plan, depend upon it it is not within the range of man's ingenuity to amend it, and he will better serve his own interest in accommodating his views to her laws than in attempting to oppose them.

Before the foot can be prepared for receiving a new shoe it will be necessary to remove the old one, in doing which great care should be taken to raise all the clinches, and every approach to violently wrenching it off should be scrupulously avoided, dragging the nails with their turned down ends through the crust, not only inflicts pain upon the horse by their pressure on the sensitive parts within the hoof, as is evinced by his flinching and struggling to free his foot from the grasp of the smith, but separates the fibres of horn beyond what is necessary, and interferes with the future nail-hold. If the shoe resists a moderate effort to displace it, one or two of the nails that appear to retain it the most should be partly punched out. By this small trouble much future inconvenience will be saved, the enlargement of the nail holes prevented, and the crust left in a firmer and sounder state to nail to.

The foot being relieved of the shoe should have the edges of the crust well rasped.³ To do this effectually requires a degree of force calculated to arouse the fears of the uninformed, and to make them suspect something like wanton destruction of the hoof. It is, however, only removing those parts which in the unshod foot would have been worn away by contact with the ground.

The operation of paring out the foot is a matter requiring both skill and judgment; and is moreover a work of some labor when properly performed. It will be found that the operator errs much oftener by removing too little than too much; at least it is so with the parts that ought to be removed, which are sometimes almost as hard and unyielding as a flint-stone, and in their most favorable state require considerable exertion to cut through. The frog, on the other hand, offers so little resistance to the knife, and presents such an even, smooth, clean looking surface when cut through, that it requires more philosophy than falls to the share of most smiths to resist the temptation to slice it away, despite a knowledge that it would be far wiser to leave it alone.

It would be impossible to frame any rule applicable to the paring out of all horses' feet, indeed to the feet of the same horses at all times; for instance, it is manifestly unwise to pare the sole as thin in a hot, dry season, when the roads are broken up and strewn with loose stones, as in a moderately wet one, when they are well bound and even, for in the former case the sole is in perpetual danger of being bruised by violent contact with loose stones, and consequently

needs a thicker layer of horn for its protection, while the latter case offers the most favorable surface that most of our horses ever have to travel upon, and should be taken advantage of for a thorough paring out of the sole, in order that the internal parts of the foot may derive the full benefit arising from an elastic and descending sole; a state of things very essential to the due performance of their separate functions. Again, in horses with upright feet and high heels horn grows very abundantly, especially towards the toe, and such are always benefited by having the toe shortened, the heels lowered, and the sole well pared out, while in horses with flat feet and low heels horn grows sparingly, and the toes of such feet, being always weak, will admit of very little shortening. Such heels, being already too low, should scarcely be touched with a rasp; and the sole presents such a small quantity of dead horn that the knife should be used with great discretion. In the first case, the thickness of the sole presents the due descent of the coffin bone, when the horse's weight is thrown upon the foot, and it requires in consequence to be pared down thinner and rendered more yielding, while in the latter case it is already so thin and unresisting that it can with difficulty support the coffin bone in its proper place, and offers at best but a feeble resistance to its downward tendency.

The consideration of the foregoing circumstances will show the impracticability of prescribing general directions capable of meeting the exigencies of all feet, and the futility of attempting to establish one particular mode of paring out all feet, one particular mode of applying the shoe, or one particular form of shoe. They must, each in its turn, be varied to meet the degree of deviation from what may be called a perfect foot. Perfect feet are indeed tolerably well formed, with a fair growth of horn, should have the toe shortened, the heels lowered, and the sole well pared out, that is, all the dead horn removed, and, if need be, some of the living, until it will yield, in some small degree, to hard pressure from the thumb. The corners formed by the junction of the crust and bars should be well pared out, particularly on the inside, for this is the common seat of corn, and any accumulation of horn in this situation must increase the risk of bruising the sensible sole between the inner point or heel of the coffin bone and the horny sole. I much doubt either the utility or wisdom of leaving the bars projecting beyond the surface of the sole. It cannot possibly increase the power of resisting contraction, and this projecting rim is left exposed to the danger of being broken and bruised by contact with stones and other hard substances; and it is further attended with the disadvantage of making the cleaning out of these corners a work of considerable ingenuity. I prefer paring them down to a level with the sole, or very nearly so, avoiding, however, every approach to what is called "opening out the heel," a most reprehensible practice, which means cutting away the sides of bars, so as to show an apparent increase of width between the heels, which may for the time deceive the eye, but it is a mere illusion, purchased at the expense of impaired power of resistance in the bars and ultimate contraction of the feet. It is self-evident that the removing any portion from the sides of the bars must diminish their substance, and render them weaker, and consequently less able to resist contraction.

The only recommendation I have to offer concerning the shoe itself has reference not to its form, but to its weight, and is suggested by the prevailing idea that shoes cannot well be too light. A very little reflection will convince us that this notion must be founded in error, involving, as it does, two most objectionable properties in a shoe, viz.: liability to bend, and insufficient covering.

The inconvenience to a horse of an ounce or so of increased weight in each shoe is not worth a moment's consideration compared with the discomfort to him of traveling upon a hard road with a bent shoe on his foot, straining the nails and making an unequal and painful pressure.

The following volunteer paper was read by Mr. John T. Blois, on

FENCE POSTS.

Very few things of equal importance receive so little attention as the proper time of cutting and the proper preparation of fence posts. As a general thing, upon the durability of the post in the ground depends the durability of the fence itself; for after the post has once rotted off, the fence boards are rarely ever fit for another fence, while a fence rarely gives out as long as the posts last.

Many persons, especially in farming, do things without any reason other than the practice of others, never thinking of the philosophy of their acts, often consulting mere convenience in preference to philosophical rule. This may do for a novice, but when there are differences of opinion, the operator should always have a reason for his acts. Why set a seasoned post in preference to a green one? Why with the butt up instead of down? Why cut the tree for it at this season in preference to that? Why, in pruning, the first of August instead of spring, and the like for clearing off underbrush for tillage; in short, the operator should always ask himself the reason for all his acts.

For reasons stated below, about the first of August, in the latitude of 42°, is the best time for cutting down deciduous trees for timber in Michigan. It is generally conceded that the red cedar is the most durable for posts in its natural state. Of deciduous trees, hard and fine-grained woods, as the locust, swamp oak, burr oak, white oak, and some other kinds of wood, have been found preferable, while thriftily growing and with due preparation. The tree should be slashed down about the first of August, and, as soon as convenient, and before the wood borer attacks it, taken to the saw mill and sawed into posts suitable for the fence to be built. Five inches square, or five by six inches, or other dimensions may be found convenient, but never saw them "heads and points," as is usual, otherwise one-half the posts will have to be set with the butt down, and the other half up, and be sure as one very important observance to have some mark or designation by which to know which is the butt end of the post before it is treated and set. After being sawn they should be piled and thoroughly seasoned through before preparation. Then the portion to enter the ground, and four to six inches of the wood above the ground should be Kyanized (this word is derived from Kyan, the name of the person who discovered the process), and to make the post still more durable by isolation of it from all ground moisture, a thick coat of coal-oil tar should be applied to the Kyanized parts. Be sure to Kyanize and apply the tar, and set in the ground the end opposite the butt of the tree. These directions, if faithfully followed, will make the posts impervious to ground moisture, and as proof against decay as the red cedar. I have oak posts, bought in market (not knowing when cut), treated by Kyanizing alone, set sixteen years ago, each as sound and perfect and firm in the ground as when set, and I believe they are good for sixteen more years at least, while I have a neighbor who built an eight-dollar-per-rod fence, with what he thought first-rate posts, and the posts rotted off in three years. If posts are cased, as for a picket fence, they should be Kyanized and tarred the whole length, especially at and above the surface of the ground, as casing has a tendency to dry-rot the post under the casing. But better still,

instead of casing a post, have the post sawed the required size, say ten inches square or so, and omit the casing; thoroughly season it; treat the part going into the ground and six inches above ground as above stated; plane smooth, cap, finish, and paint the balance. It is good to set posts with wood ashes, leached or otherwise; set firm two inches at bottom, and surface of the ground likewise. From four to six inches above, or rather at the surface of the ground, the post is most liable to decay, and should be thoroughly treated, and the post should be perfectly free from sap wood.

A riven post or stake, riven from center to circumference, mind, is far better than sawn. Why? Because the surface of the post or stake is bounded by walls of perfect *lignum* fibre, parallel and in line of the tree growth, and not across sap cells, except at the bottom of the post or stake, while a sawn post, more or less, unless the tree from which it is sawn is very straight and thrifty, crosses the sap-cells, and therefore introduces the moisture into the interior of the post. There is not room in this paper to give all the reasons for the positions above taken.

How to Make a Kyanizing Bath.

Dissolve one pound of corrosive sublimate in twenty gallons of water, in a tight half hogshead or rectangular box of the proper height, and stand up the posts in the liquid for two weeks. Be sure all the necessary parts of the posts to be Kyanized are under the liquid during the time, then take out and dry, and fill up the bath with more posts. If the liquid evaporate, add water and more of the solution, when necessary.

A bath of strong lye from potash or wood ashes makes a fair substitute, and it is presumed the cheaper solution made from copperas (sulphate of iron) and water would form a styptic equally effective. The corrosive sublimate solution will not, however, be very expensive, as so large a number can be treated with so small a quantity.

Now for the reason of the rule and a little vegetable physiology: As to the best time for cutting the tree, as stated above, there are numerous opinions among farmers. A prevalent notion has been the first of February, both for rails and posts; some contend June the better time, when the bark peels easily, but numerous experiments have fixed upon the last of July or first of August, being about the close of the chemical and beginning of the thermal period or crisis in vegetable growth when the terminal bud is formed, although the particular day cannot be determined. I am aware of various opinions of vegetable physiologists in regard to the exogenous movement of sap and its conversion into wood in our deciduous trees, but I am confident in the theory that the sub-cells are so formed as to move the sap from the root upward to the buds or leaves, anastomosing between the wood-layers from one cell to another, and by the inhaling and exhaling powers of the leaves the sap becomes decarbonized and flows down the outer side of the tree, between the bark and sap-wood, and forms the annual wood growth. The course of the sap-cells to conduct the sap is from the root upward, therefore a post set with the butt down in the ground will naturally, by capillary attraction, raise moisture upward in the sap-cells and rot it, and the reverse, if the butt is set upward. The tree is in rest during the winter. The greatest flow of sap is in the spring, and the least at the summer crisis; the tree the largest in the former case by the expansion of the sap-cells, and the smallest in the latter case by their contraction. The flow of sap gradually decreases until the terminal bud is formed and hardened on the limbs

of the tree, at the summer crisis, when it stops. The tree has exhausted all its powers; the sap-cells have closed up, and that is the time to sever the tree; that is the time to pinch in grapevines; to cut and clear underbrush to prevent sprouting for tillage; but here remember to cut off below every bud, smothering it (the leaves are the lungs of plants, and a bud is an incipient cluster of leaves), otherwise, as there is a connective attraction between every bud and the root-sap, the bud, after the recuperation of the tree, will start and grow; this is the time to beat off the sprouts that sometimes grow from under ground out from the body and roots of an apple tree, which, if beaten off below every bud, no more will come. Cover up the wounded roots and body of the tree. Never cut off the sprouts with a knife; this is the time to prune orchards to prevent sap-suckers the following spring. Why? Because being then no flow of sap, the wood of the wound will season in one quarter of an inch, and the weak flow of sap that follows after the crisis for six weeks will heal over the bark wounds, and strike out new channels without suckering, and in the spring following will enlarge those channels sufficiently to carry off the sap without breaking out into suckers, while if you prune in the spring when there is a gushing flow of sap, every limb severed dams up the sap, and it breaks out into sap-suckers. If you cut off a large leader there is so much sap flowing in it that it keeps flowing without healing, flowing down the tree, turning the bark black, becomes a running sore that never heals, but finally rots the wood of the tree, and sometimes causes premature decay.

Unfortunately the first of August is just the time when farmers are crowded and exhausted with work, and have no time to do the labor above prescribed, and perhaps some may try to persuade themselves that the more convenient spring time may do just as well.

In conclusion, it may be further remarked that posts should be cut from what is usually called second growth of timber, and not from spalt-hearted old trees. The post should be thoroughly seasoned for the purpose of shrinking more tight the sap-cells, for the inside moisture is the great cause of decay, hence the reason why green posts prematurely rot off; and, again, if the posts be set green, with open sap-cells and butt in the ground, there is a continual effort by capillary attraction to raise moisture from the earth into the body of the post. It is therefore better that the post be set with the butt upward, and thus reverse the tendency to capillary attraction. Timber, to be free from decay, must be kept perfectly and continually dry, or continually under water, therefore the longer the post is kept dry, the longer it will last. There must be an outside protection to keep out the moisture and wood-borer, and this is accomplished by the bath, which will penetrate one-half inch into the wood, and, if the tar be then employed, the wood will be kept entirely impervious to moisture.

The number of papers read at this Institute was unusually large, and but few of them as thorough and exhaustive of the subjects treated as we should desire for this report.

We have been compelled to make a selection from thirty papers or more, and the foregoing are those that in our judgment were most suitable to be published.

The following papers, some of them of considerable merit, have been omitted:

“Order on the Farm”—J. F. Ball, Cambria.

“Rotation of crops”—E. C. L. Mumford, Moscow.

“Farm Tools, their care and use”—Wm. Drake, Amboy.

“Hints on Farm Management”—R. W. Freeman, Litchfield.

"Poultry and Their Profits"—W. H. Tallman, Hillsdale.

"Saving, Making, and Handling Manure"—Samuel Johnson, Scipio.

"Wind Breaks for the Farm"—L. S. Ranney, Hillsdale.

"Can Dairying be made Profitable in this County"—John Fitzsimmons, Reading.

"Mixed Husbandry"—N. Clark, Ransom.

"Farmers' Homes"—F. M. Holloway, Fayette.

"Can Peach Growing be made Profitable"—Geo. A. Smith, Somerset.

"Underdraining"—A. B. Slocum, Wheatland.

"Feeding Stock"—L. Ranier, Jefferson.

"The Horse most Profitable to this County"—N. Alvord, Camden.

The Hillsdale Institute did not adjourn the second evening, but held an extra session on Saturday forenoon to finish the work laid out in the programme of exercises.

At the close a vote of thanks was tendered the professors who were present from the Agricultural College, and to Col. F. M. Holloway, for the very efficient manner in which he presided, after which the Institute was declared adjourned.

INSTITUTE AT OWOSSO.

The Owosso Weekly Press, of February 7th, made the following general remarks regarding this Institute:

"The Farmers' Institute appointed by the State Board of Agriculture to be held in this city on Monday and Tuesday, January 29 and 30, opened Monday evening, at Gould's Hall, with a good attendance of the substantial producers of Shiawassee county, gentlemen and ladies, every town being represented. There were present from abroad, Professors Cook, Garfield, Ingersoll, Beal, and Fairchild from the State Agricultural College at Lansing, Prof. Miles, of Lansing, Mr. Baird, Secretary of the State Board of Agriculture, and others.

The meetings were also attended throughout by a large number of citizens not having any special interest in agricultural pursuits. The hall was filled at every session with a crowd of animated participants and attentive listeners, and when the sessions broke up the streets presented a gala-day appearance. Altogether, it was one of the most satisfactory, and even felicitous gatherings Owosso has for many a day enjoyed, and in results must be of immense benefit to the county."

MONDAY EVENING.

The exercises were opened with prayer by Rev. L. O. Lee, followed by a song,—*"The Flag that Waved a Hundred Years,"*—the choir being led by C. C. Duff.

The opening speech by the President, Col. E. Gould, was brief, as the speaker intimated, because there had been some delay in commencing the exercises, and time had become precious. His remarks were chiefly commendatory, relative to endeavors to improve the intelligence of the agriculturalists. All the professions had their distinctive studies and schools, and there is no reason why the farmer should not have his.

The following lecture on

“TRICHINA SPIRALIS”

was given by Prof. Cook :

The subject of this lecture, though one of the minute objects of creation, demanding when young the aid of the microscope that it may be even visible to human sight, is one of exceeding interest, and of as great importance. What more wonderful than that an animal so small as to be almost invisible to the eye can eat, move, and even reproduce itself? What more important than the knowledge that these minute animals are able to overcome even man himself? What more startling than the fact that to-day, as through all the past, these same worms, seemingly so insignificant, have been engaged, all silent and unknown, in their fatal work, now claiming a single victim, now snatching a whole family, and anon demanding human tribute from an entire community. It is indeed true that with the sharper vision, which added intelligence always gives, modern research has traced to this cause some of the most terrible epidemics of the past.

The interest in this subject is still further enhanced by the fact that as yet medical science has devised no cure for the attacks of this parasite. But science, the great philanthropist of our time, has pointed to preventive measures. And in this case, of all others, with a terrible loathsome disease as the dreaded evil, prevention would be greatly preferred to cure.

Let us, then, examine the pork-worm's place among animals, with a brief notice of some of its relatives, then study its natural history, next speak of its discovery, show how its continuance is secured, how and why it affects man, and lastly give such practical suggestions as are of interest in the premises.

The Trichina spiralis' Place in the Animal Kingdom.

The pork-worm is correctly named, as it belongs to the great class of articulated animals,—those which are made up of rings,—called worms.

It is hard to describe this class of animals, for taken as a whole they are very diverse in their peculiarities, though by studying the various individuals we find affinities which lead us to establish the class. This fact that what are known as natural groups of animals will not admit of a fixed and absolute definition, but that animals of any group possess characters which not only seem to separate them from others of their class, but also to link them to other groups, is one of the facts which has led the most of our students of natural history to adopt the theory of evolution as the true theory of creation.

While I may not give you a reliable definition of the class worms, I would like to correct a very popular mistake in reference to the group. The only worms that are familiar to you, I dare say, are the earth worms or angle worms, the leeches, and perhaps the hair-worms. It is very common to call the young of *insects* worms, as we speak of the canker worm, the tomato worm, the current worm, etc. Now, true worms are always cylindrical, footless, and uniform from head backwards from the egg till death. Not so with caterpillars, slugs, maggots, and other so-called worms. These are but the first stage of the less repulsive flies, or the beautiful and attractive moth or butterfly.

The pork worm belongs to the parasitic worms, a very numerous division, and so named because they subsist on the substance of other animals, on which they depend even for existence.

The independent worms are of a higher order, called annelids, some of which live in the ocean, possess beautiful tufted gills, quite a complex circulation, red blood, a well defined head, with eyes and mouth, and a complete alimentary canal. Our common angle-worm is an annelid, but is destitute of gills.

The lower orders, on the other hand, which include the various parasites, including the trichina, have no breathing organs, are without red blood, while very many have no head, no intestine, no nervous system. The reproductive organs of these lower orders of worms are very highly developed, and their prolificness oftentimes almost beyond computation. This is true of all animals where the conditions render the existence of the young very precarious. It is estimated that the human tape worm (*Tænia solium*), Fig. 1, which, when mature, is domiciled in the alimentary canal of our own species, will produce 25,000,000 eggs. Yet, notwithstanding this tremendous fecundity, nature has very kindly made the "struggle for life" so severe that very generally not one of these myriad eggs finds opportunity to develop.

A very strange freak in animal reproduction finds illustration among some of these lowest worms, which, with other facts, lead the evolutionist to believe that plants and animals had a common ancestry. I refer to reproduction by fission. Nature uses growth as a knife, so to speak, by which she divides an animal, and then, like a true nurseryman, she plants each part in the proper surroundings, and lo! there are two perfect animals. Nature does with these animals just what she alone, or with the aid of the nurseryman, does with our vines and trees. She cuts an individual asunder, and from the parts makes two as perfect as was the original. Nor with the lowest worms does this seem so strange as with plants even, for they are more homogeneous. The plant has its roots, its stem and its leaves—all different and for a different function. Not so the worm; each part seems a perfect fac simile of every other part, not only in structure but in purpose. So if these simplest worms are cut in two, the parts have only to heal that they may be their former selves abbreviated.

Again, some of these lower worms reproduce by a process of budding, not unlike that familiar to the botanist. A bud starts from the worm, which, by growth and development soon duplicates that from which it arose, and soon, instead of one worm, we have a cluster. Here, again, we have a claim to distant relationship with plants. This budding is illustrated in one of the most fatal of human tape worms, *Tænia echinococcus*.

Another peculiarity among some of the parasitic worms, which is also claimed by some even of the highest plants, and thus marks a distant affinity, is that individuals are both male and female at the same time, and hence are what are called hermaphrodites. Each individual possesses both male and female organs, and self-fertilization is not only possible, but imperatively necessary to reproduction. This is true of all tape worms. The fact that all the higher groups of animals often make attempts towards hermaphroditism is surely not without significance.

The whole number of described species of parasitic worms is upwards of 2,000, while more than 100 species are found in man and the domestic animals.

To any who may wish to pursue this subject further, I would state that the best treatises are in foreign works, and mostly in French or German, though there is much in our own literature. Those who wish for pure science will procure Dr. Packard's "Life History of Animals;" also Dr. J. Leidy's "A Flora and Fauna within Living Animals," in Smithsonian contribution for 1852. Those who prefer the more practical part of the subject will find a very full and interesting exposé of the whole subject, by Prof. Verrill, in the report of the Connecticut Board of Agriculture for 1869 and '70, and a less elaborate treatise in the valuable work just published by Prof. James Low, "The Farmers' Veterinary Adviser,"—a work which I heartily recommend to every farmer, and

from which we procured, through the courtesy of the author, the cuts illustrating this article.

I have already stated that it was impossible to define the class worms, as some of the species so mimic, even in structure as well as form, some of the species even of the other *branches*, such as vertebrates, mollusks, and radiates, that some authors in their classifications have put them in such company, while many that are generally regarded as belonging to other branches are now classed among worms, and that too by some of our first naturalists. In fact it is well nigh impossible to give a positive definition to any group of animals, which of course is easily understood if all animals have a common parentage.

To give the orders of worms that contain all the parasitic species is likewise difficult, as there are as many plans as there are authors. The following is simple, and perhaps as satisfactory to our purpose as any:

1. Cestodes. This order includes the tape worms and their immature forms, measles and bladder worms, and are found quite generally in vertebrates, insects, and mollusks.

These animals, though destitute of a mouth and digestive apparatus, possesses a true head, with hooks by which they maintain their hold. The remainder of the body is, when mature, composed of a series of joints, which finally separate, when each exists for a season. Each of these joints possesses sex organs, both male and female, and in them the young develop. These are



FIG. 1.

Head and a portion of the body of *Solium*.

and to be composed of 800 joints. Hence we understand their almost unparalleled fecundity. The broad tape worm of man exceeds 30 feet in length, possesses 10,000 joints, and may produce 10,000,000 young.

As examples of tape worms we have those of the hog and of cattle, which when young are the measles of human flesh, and pork, and cattle respectively, and when old are found in the human intestines; several tape worms of the dog, known as the bladder worm of sheep and cattle; the water brain of sheep, and the hydatid tumors of man, of sheep, and cattle, respectively, when in the young state. All of these in the young state are fatal when abundant, and doubtless the cause of more deaths among men and our domestic animals than we have even dreamed of. Many of the very worst of these are spread and developed through the agency of dogs. Prof. Verrill well says: "It is perfectly safe to say that at least twenty-five sheep are killed by parasites derived from dogs for every one killed by the teeth of dogs! It is also safe to say that more than fifty persons die from the same parasites for every one that dies of hydrophobia! And yet this work of destruction goes on silently and almost unobserved, except by professional men, week after week and year after year. The loss of human life every year more than counterbalances all the good that all the dogs in the civilized world can possibly do."

The second order is *Trematodes* (Flukes). The flukes are flat worms



FIG. 2.

Fasciola hepatica.—Sheep Fluke.

(Fig. 2) without distinct joints, and are often found in both vertebrate and invertebrate animals. They have a complete alimentary canal, except that it is closed opposite the mouth. One or two large vessels empty near the posterior of the body, which arise from the union of smaller vessels, and these from still smaller, till at last

the smallest of all arise in the tissues of the animal. These vessels (See Fig. 2) are supposed to be excretory in their function. Some of these flukes are hermaphrodites. These animals at two stages of their development exist in water, hence are most dangerous when the affected animals are kept in damp pastures. The liver flukes of sheep (Fig. 3) and cattle are the most noted example. These parasites cause the disease known as the "rot," "water rot," and "fluke rot."

Omitting the *Acanthocephala* (thorn-headed worms) as of less interest to our present purpose, I proceed to the last order.



FIG. 3.
Distomum lanceolatum.

Nematodes (Round Worms).

These more highly organized parasitic worms are familiar to us in the pin-worms of children, and the notorious *trichina spiralis*.

In this order there is a complete alimentary canal, the sexes are distinct, while in form they are generally round and slim, the head being at the smaller end. As in the tape-worms, there are two forms, representing different ages, which are very different in appearance, habits, function, and surroundings. These abound in nearly all parts of mammals, birds and fishes. One thousand species have been described, about one dozen of which may infest man. Next to those already mentioned, the common round worm of man is most commonly noticed in this department of literature, and is probably the most apt to attract attention of all.

The most dangerous species of this order, in fact of all human parasites, is the *Trichina spiralis*. Let us then leave the general discussion of worms, and confine our attention to the pork-worm. We will first consider its

Natural History.

The mature animal (Fig. 4) is a small round worm, found only in the intestines of the following animals: The hog, man, dogs, cats,

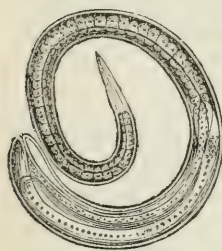


FIG. 4.
Adult *Trichina*.—Highly magnified.

rats, mice, etc. The male is 1-18 of an inch long, while the female is much longer, attaining $\frac{1}{8}$ of an inch. The head end of both sexes is tapering, while the posterior extremity is abrupt. At the apex of the tapering extremity of this thread-like worm is the minute mouth. Following this is the œsophagus, flask-shaped stomach, and intestine which, ends with the rectum. In the male, as in birds, the rectum unites with the seminal ducts into a common duct or cloaca. The interior male organ is seen, even in the young, lying in the posterior part of the body, and consists of a closed sac, which with maturity ends in the seminal duct. The rectum, which receives this, bends forward after leaving the body, thus forming the external male organ, which lies between two lobular appendages. The female possesses an ovary which is visible even in the young. When mature there is also a uterus, in which the eggs hatch, and an external opening which is located one-quarter the length of the animal from the head. The ovary occupies the posterior one-third of the body, and in it of course, and along its entire length are developed the eggs. The uterus extends from the ovary to the external opening. These animals are ovoviviparous then, as the animals come forth after hatching takes place.

The young trichina are like the mature ones, except that the sex organs are but feebly developed. These are found all through the muscles, and can be discerned only by the aid of the microscope. Even the muscle gives no indication to the unaided vision of the presence of this terrible visitor. The young, as seen in the muscle, are generally coiled (Fig. 5), in fact after they reach the ultimate fibers, which they cause to disintegrate, they always coil up, and at last become $\frac{1}{3}$ of an inch long. Owing to their motion and eating an irritation is created, which causes them to



FIG. 5.

become encysted or surrounded by a little sack called a cyst or capsule. (Fig. 6.) In time there is a deposit of lime in the cyst, when it appears to the eye as a minute speck.

Now let us trace the life history of these minute, yet terrible destroyers. We suppose that man, or a proper animal, as the hog or rat, eats some meat with the young trichina, with or without cysts (Figs. 5 and 6) in it. The cysts are soon digested by the gastric juice of the stomach, the same that digests the muscle containing them, when the liberated worms commence a rapid development. In five days they are fully developed, when the females (Fig. 4) become fertilized, and in seven days begin to produce the young, which they may continue to do for six or eight weeks. These minute young at once pierce the intestinal walls, when they are probably carried by the blood to all parts of the body. In fact so rapid is their distribution that no other explanation will account for it. In about two weeks the muscular or young trichina attains its maximum size, about 1-30th of an inch in length. In four or five weeks the cysts are fully formed, and in about a year the cysts become calcified or receive their deposit of carbonate of lime. Thus these may remain for years, and even decades without becoming extinct, remaining, even though the muscle be salted and smoked, in a dormant state, only awaiting the proper conditions that they may awake from this stupor and again bring ruthless disease and terrible death.



FIG. 6.

History of the Pork Worm.

Prior to 1835 this parasite was only known as a calcified cyst, its life history as just given awaiting the more perfect development and use of that most marvelous of modern instruments, the microscope, for its solution. The finding of these sluggish worms, so snugly domiciled in their capsules, without sex organs, was eagerly appropriated by the advocates of spontaneous generation, as an unanswerable argument in favor of their theory. But with more knowledge, this, like all the other props to the doctrine of spontaneity of life, have toppled and sunk to nothingness.

From 1835 to 1860 the trichina was studied simply as a matter of scientific interest. To be sure there was a fascination in developing those wondrous life changes, which is ever the rich possession of the naturalist, but the subject lacked that pathos which invested it so soon as it was known that in these minute animals existed the germs of a terrible mortality, which might fill our homes with gloom and mourning. Paget discovered the encysted worm. Owen in 1835 described it, giving it the name *Trichina spiralis*. In 1847 our own Leidy found that the same animal was to be found in the muscles of swine.

In 1851 Luschka corrected the mistake that the blunt extremity was the head. In 1859 Leuckart and Virchow, by feeding the trichinous flesh to hogs and dogs, reared the mature animals, which they confounded with another parasite.

In 1860 the momentous importance of this subject became known, for in this year Zenker discovered the myriad parasites in the flesh of a girl brought to the Dresden Hospital for treatment of supposed typhus, where she died. He found the flesh full of the young, and discovered the mature worms in the intestine, traced the origin of the disease to the eating of uncooked pork, and thus unmasked this seemingly harmless and insignificant worm, and revealed it as the author of a most fatal and excruciating disease. Thus one case in the hands of a wise physician elucidated the whole subject, and threw the needed light on cases which had perplexed the wisest practitioners. Thus Zenker showed the origin of the dreaded disease trichinosis—eating trichinous pork. Both Zenker and Virchow showed that the worms developed in the intestine, and that the young when born migrated at once to the muscles, when they destroy its integrity. Zenker, Virchow, and Luckart showed that these muscular forms grew to maturity in the muscles, which as Zenker demonstrated, caused the terrible trichinosis, which resulted in the death of the human sufferer, and as Virchow showed, were also fatal to the lower animals. Zenker showed that capsulated or encysted trichina were cases of natural cure. Thus healthy animals may carry the seeds of recurring disease.

Since this famous and momentous discovery of Zenker, the cases of undoubted trichinosis have been alarmingly common. Add to these the cases diagnosed as typhoid fever and acute rheumatism, but which were really the work of these fell destroyers, and we have a showing that may well make us tremble with apprehension. Not to go outside our State, we note the cases at Port Huron, Detroit, Flint, and South Haven, which latter were under the charge of a physician born and educated in this county, and once a resident of this city. The fact of these cases, coupled with that of the obscurity of the disease, and a want of knowledge of its symptoms among very many physicians, leads to the unwelcome conclusion that trichinosis is no rare visitor among us, a conclusion which demands of us all that we give the subject most earnest consideration, lest we ourselves become victims.

How the Existence of the Worms is Continued.

As already stated, the trichina will exist and prosper in the intestines of hogs, rats, mice, cats, and rabbits, etc., as well as in those of man. The young, too, will thrive in the muscles of the same animals. It is probable that it inhabits for the most part the interior of man, the hog, and the rat. Hence we see that if trichinous flesh from any of the above animals be eaten by animals of the same species, trichinosis is most sure to result. Man may become a victim by eating pork or sausage in which the young worms have not been destroyed, while rats and hogs may be inoculated by eating trichinous flesh of other rats or hogs which have died of the disease, or in case of hogs, flesh of slaughtered hogs which are suffering or have previously suffered from the disease.

Again, the gravid females, together with the young trichinae, may pass from the intestines, either of man, rats, or hogs, during the diarrhoea which always attends the incipient stages of the disease. Hence the swine, if permitted to go half starved, or if allowed or forced, as is far too often the case, to feed in the

midst of such filth as excrement from man or hogs, we can easily see how the mature forms may again enter the intestines and thus scatter the plague.

Why Man is Liable to Attack.

The fact that the human tissues afford the most acceptable pasturage for these dreaded parasites, and as but few of the human family are Jews, and thus debarred from a liberal allowance of pork in their diet, which, therefore, is now a staple article of food in all countries, in many of which it is relished and eaten when partially or wholly uncooked, with the added fact that the usual preparation of smoke and salt is no security against the life of the parasites, at once explains the fact that man is an ever ready target for this awful disease, from which, as yet, knowledge and caution form the only sure armor of defense. It is true that if the worms are not very numerous the person attacked may suffer little disturbance and soon recover. Very likely a half million of the parasites would fail to disable a person of a good vigorous constitution. This might seem the silver lining to this overhanging cloud. Yet when I state that a single ounce of pork may contain 300,000,000 trichinæ the silver vanishes and we see that one meal of pork may swing wide open the portal to the tomb. In a little sausage, hardly equal in size to the finger nail, I have found scores of the young trichinæ, and often in a piece smaller than a pin head I have discovered under the microscope over a score of the encysted worms. So we see that the danger is by no means imaginary, and that safety can only be secured by great vigilance.

Symptoms of Trichinosis.

As a preface to practical suggestions, let us glance at the symptoms of this disease. At first, while the worms are confined to the stomach and intestines, there will be nausea, vomiting, retching, and diarrhoea. As the young commence to migrate, and begin to feed upon the muscles, if very numerous, the disease assumes a more startling nature, somewhat resembling typhoid fever, with acute rheumatism. There is profuse perspiration, great soreness of the muscles, drawing up of the limbs, consequent upon the contraction of the irritated muscles, labored breathing, dropsical swellings, rapid decline of vitality, and speedy death. In case the sufferer survives, the recovery is slow, corresponding in time with the encysting process in the muscles. Very often where the attack is not fatal the person is left so demoralized physically that he becomes a prey to consumption, or some of the other maladies ever in waiting to seize upon the weak and feeble. Yet in many cases the victim entirely recovers, and lives for years a perfect example of robust strength, which shows that hogs may be sleek and fat, yet their flesh may teem with the fatal cysts.

Practical Suggestions.

As already suggested, this terrible malady yet awaits a satisfactory remedy. Early in the disease, while the intruders are still in the alimentary canal, we may hope to expel the gravid females by the use of anthelmintics, such as purgatives and emetics. Experiments seem to prove that this will at best be but partially effective. Our greatest hope lies in the direction of some yet undiscovered substance that, while it will be harmless to the individual, will be fatal to the worms. At present glycerine has given the best results. It will kill the worms, but whether it can be safely given in sufficient quantities to be effectual is yet to be determined.

After the worms get fully distributed the physician can only hope to check secondary diseases and minister to the general strength of the patient, and then prayerfully await the results.

Prevention.

Scientific experiment has shown that while the parasites may endure smoke and salt, they are not proof against heat. That if pork be so thoroughly cooked as to destroy all redness of the flesh and juices throughout, the worms will also be baked, and may thus serve to nourish the muscles, rather than to be nourished by them. In case of large pieces, such as hams, this demands much care. It seems to me that this precaution should never be neglected. No one should ever eat raw ham, bacon or pork of any description: neither should any be set on the table till the cooking has been most thorough and complete. To be sure, the hogs on the farms are less liable to attack* than those in and about slaughter-houses, yet through the agency of some tramp or a rat, access to filth or other cause, these too may bear the fatal germs, and where such serious and often appalling results are the price of neglect, no one should dare to take the awful responsibility to practice it. It is said that some of the worst cases of epidemic trichinosis in Europe have come from eating American bacon. Let no lover of pork ever think to neglect this precautionary measure, lest a most serious calamity come upon him.

As a further prevention there should be at once a thorough and absolute reform in the treatment of hogs. It would sometimes seem that all a Jew would need to do to make proselytes to his faith would be to encourage visits to some of the piggeries of our State, I believe I might say most of the piggeries of our country. Such places are far too often the very quintessence of nastiness, the perfect embodiment of filth, a most revolting example of defilement.

I fully believe that in no other respect do our farmers act so unwisely and cruelly as in the management of their swine. I never look upon the clean, beautiful, well-kept pigs at our annual exhibition without thinking that these animals at least must believe in fairs. Of course it is not necessary to rub and wash the pigs with such care, but no where about the farm should more care and neatness be exercised than in caring for the pigs. This will pay in the bettered condition of the animals, finer quality of pork, and is imperatively demanded in view of this very parasite question. The pens should be frequently cleaned, and in no case should the hogs be fed, or be obliged to make their beds in filth of any kind. If pork is to be fed to the hogs, it should be thoroughly cooked, that in case there should be any trichina, they would not be propagated.

In some parts of Europe government demands a microscopic examination of the pork by competent scientific authority. With us this is impracticable. The best that we can do is to exercise the utmost care and neatness in the management of our swine. Then if we take the most important precaution, to see that our pork is thoroughly cooked, we may feel quite safe in the assurance that we shall be preserved from one of the worst plagues that has ever afflicted the human family. Should one single case of neglect bring the grim monster to our homes how could we ever dry the tear of regret and grief, or feel to exercise self-forgiveness?

* Since this address was delivered, several cases of trichinosis have occurred in a family of Alleghan county, caused by eating uncooked ham from a hog which was fattened on the farm of the sufferers.

Mr. Clark, of Bennington, gave an address entitled "The Coming Farmer." The following paper was read by Dr. J. B. Barnes on the

"CULTURE OF SMALL FRUITS."

In compliance with the request of the committee on programme, I am here to tell you what I know about the growing of small fruits. A great deal has been said and written upon this subject within the last few years; and I apprehend that I shall find it difficult to advance anything new at this time. But the facts that I shall state, and the suggestions that I may make will mostly be the result of my own experience and observation.

Every person, both in city and country, who is the occupant of much or little land, should see to it that a certain portion of the same be devoted to the raising of small fruits, the free use of which is a promoter of health, and they are at the same time one of the greatest luxuries that we receive from the hands of a bountiful benefactor.

It is perfectly marvelous to the lover of small fruits to witness the almost total neglect on the part of the farmers of the county to cultivate the same. We met a gentleman the other day who has the reputation of being a first-class farmer, whose barns and cellars are filled with the rich products of a generous soil. His wife also has the reputation of making the best butter that is brought into this market. All the staple articles usually raised on a farm are well cared for, and his industry is generally crowned with success. We inquired if he was well supplied with a choice selection of small fruits, and the reply was that he had not given much attention to horticulture, but he designed this spring to devote a part of his garden to small fruits. Now this man has lived fifty years without such a luxury, all for the want of a greater appreciation of it and a little painstaking. Now, what is true of this man is true of nine-tenths of the farmers throughout the county. The reason generally given for the neglect of this branch of industry is that there is no money in it. There, with this farmer, as with everybody else, the almighty dollar comes to the surface. This is a sordid reason, and the man that gives it should hide his face for shame. Another reason offered by the less able farmers is that they have not time to attend to these small interests. This reason is as shiftless as the other is miserly.

Both should be discarded. An average of thirty minutes a day from the first of May till the first of November will give a family of six persons all the strawberries, raspberries, gooseberries, and grapes that they will want for the season. This thirty minutes can be utilized in the morning while waiting for breakfast, or in the evening after the working hours of the day are past. Every farmer, large or small, if he puts his mind to it can have either strawberries or raspberries on the table every day for six weeks during the berry season. We will guarantee, if the berries are furnished that the ladies' department of the household will supplement the table with a pitcher of cream at each meal. Neither will the dish of berries be scrimped, but, as the Irishman said, "you can take them to the fill of your shirt."

I once picked thirty bushels of strawberries from a small patch in my garden not equal in size to two by eight rods. The same amount of land in any shape you please will furnish to any ordinary family the desired amount of strawberries, raspberries, and gooseberries, provided they are planted as they should be and properly cared for. In the first place, the ground should be made rich with rotted manure, thoroughly plowed or worked in with a garden fork. The surface should be made smooth with the rake. For garden culture strawberries

should be set in rows two feet apart and one foot apart in the row. May and August are the two months recommended by horticulturists as the proper time for transplanting. But my experience has taught me that strawberries can be transplanted with equal safety any time from the first of May until the middle of November, provided the soil is moist and the weather favorable. But transplanting should never occur during a drouth. If we expect a crop the succeeding year the plants must be put out in the month of May or June, and all blossom buds nipped and runners cut as soon as they make their appearance. This is done to lessen the tax upon the young plant, and thus aid the roots in their increase and develop the plant the first year.

If we are in haste, and have the means, there is another and a shorter way by which the plants of one year old can be made to yield a liberal crop. This is done by placing the *chits* of the first runners that make their appearance in June in a small flower pot which is sunk to the level of the soil, the runner being kept in its place by a small stone placed on it. Plants thus treated, if put out by the first of September, will yield a fair crop the next season. This is called the layering system, and is practiced by those who have plenty of means and time, and who garden for pleasure. Ordinarily it takes the growth of two seasons to secure a crop.

During the drought of the past season we had to resort to every conceivable plan to secure young plants. The scarcity of plants prompted me to save what I had all my life looked upon as worthless. During the dry season the runners from the main hill would grow liberally, but the absence of moisture in the ground prevented the *chits* from taking root. During the four months I transplanted all the well developed plants, which were far less in number than the *chits*; then later I trimmed and planted them in a mellow soil in my garden. This was done by taking the crown of the *chits* between my thumb and two fingers and placing them firmly in the soil prepared, after which I gave them a thorough watering, and to my great surprise nearly all of them took root and bid fair to become thrifty vines for transplanting in the spring. The strawberry plant is a hardy and thrifty vine, and will survive almost any treatment, but, like every body and thing that has life, it appreciates kind and generous attention.

I have said that in the garden culture of this fruit the rows should not be over two feet apart and one foot in the row. This is for the reason that in the garden the cultivation is all done by hand, and every foot of land is to be utilized. But my experience is that in field culture from thirty to thirty-six inches between the rows is the proper distance, and from twelve to fifteen inches in the row. This gives ample room to use the subsoil plow and cultivator, which must be largely depended upon if we expect to realize a fair profit from the crop.

Varieties.

"Now comes the tug of war." We have some fifty varieties, and each has its advocate. The difference in the judgment of different persons touching the good or bad qualities of any berry grows out of location or climatic influences, and a berry that proves a success in one locality will prove a failure in another. Some berries require a heavy soil, and the demand of others is equally great for a high porous soil. We have tried a great many varieties, but for all kinds of soil, all kinds of climate, and all kinds of treatment, the Wilson is unsurpassed. I have had the Jucunda on my grounds for the last ten

years. It is one of the largest berries grown, and of good quality, but its prolific qualities so highly spoken of by others failed with me. The Colonel Cheney has made quite a demand upon the attention of the fruit grower of this choice fruit during the last three years. The berry is very large and prolific, two qualities essential to its success, and from the general appearance of the vines upon my own grounds I am of the opinion that they are adapted to our soil and climate, and, if so, will be a great acquisition to that species of small fruit in this section.

The Springdale and Cumberland Triumph are also new varieties, and originated with Amos Miller, of Carlisle, Pa., and are entitled to our consideration. The two latter varieties were produced by fertilizing the Green Prolific with Jucunda. In describing the Cumberland Triumph, Mr. Miller uses the following language: "Cumberland Triumph.—In this berry there is a most beautiful blending of the fine form, high flavor, and large size of Jucunda, with the vigorous growth, hardihood, and productiveness of Green Prolific. The past season it has been fairly tested alongside of a number of popular varieties, new and old, and combining very large size, perfect form, exceedingly fine flavor, vigor of growth, and productiveness, it stands unrivalled. Berries under ordinary field culture, without stimulating manures, or pruning, or thinning out, measuring five inches in circumference, and maintaining a more uniformly large size throughout the season than any berry I have ever grown. Plant very vigorous and productive; fruit of the finest flavor; color light; perfect form; a few days earlier than Green Prolific, and continues bearing longer, thus prolonging the season. Berries selling at 25 and 30 cents while others are selling at 12 and 15 cents. Staminate; \$3.00 per dozen." In addition to this statement we have the authority of many distinguished cultivators to the truth of the same, among whom is Mr. Saunders, superintendent of the public garden at Washington, and H. Watts, Commissioner of Agriculture, whose testimony is that it cannot be excelled. One of the editors of the Country Gentleman went over the fields of Mr. Miller the last season, and fully confirms the statements made by Mr. Miller and others. Another and more convincing evidence of the superiority of this berry, is the fact that it led all other berries at the late centennial, and came out triumphant, bearing off the fruit prize.

The Springdale has less distinguishing qualities, but is spoken of in the highest terms. As the doctors say, I have all the late varieties under treatment, and will give you the result of the practice after the fruiting season.

Treatment of the Strawberry after Fruiting.

As soon as fruiting is past mow the patch or field, as may be, the same as you would your lawn. As soon as the vines are well covered and dry incorporate them thoroughly with the mulch already on the ground. If you have enough of the combustible on the ground to make a clean burn, watch your opportunity and avail yourself of the first favorable wind and burn it off. Sometimes it is necessary to add a little more straw in order to make a clean burn. After this is done there is nothing more required other than to see that the ground is kept clean until winter closes in. When the ground is frozen sufficiently so that you can drive on to it without breaking the crust, distribute your straw and cover your vines so that they are concealed from sight. This is all that is required until the next spring, when the straw is to be removed from the vines, but left in the spaces between the rows as a mulch for the coming season.

Raspberries.

Next to the strawberry comes this delicious fruit and scarcely of less importance. As the strawberry goes out of market the early varieties of the raspberry come in. As with the strawberry, so with the raspberry, a great many varieties are offered, and it will be impossible for me in the few minutes allotted for the discussion of this subject to speak of any except the leading varieties. The one that we cultivate more than any other is the Davison Thornless. We prefer it for these reasons:

1st. It is perfectly hardy and stands the winters in this latitude.

2d. It is free from thorns.

3d. It is very productive.

The Mammoth Cluster is highly spoken of by that veteran small fruit grower, A. M. Purdy, of Palmyra, N. Y. With us the Seneca County Black Cap stands at the head of the late black cap varieties. It is hardy, thrifty, and productive, the berry being of fine size and decidedly meaty. The Doolittle is another variety of long standing and of no mean note. We have found all of the above varieties to be perfectly hardy in this latitude. For field culture they should be planted in rows seven feet apart one way and three feet the other. This gives ample room to cultivate one way with the horse. For garden culture the distance of the rows may be lessened somewhat. The red raspberry is quite as much sought after as the black cap, especially for canning purposes. With us the Kirtland has more good qualities to recommend it than any other berry that we have raised. The size of the berry is fair, color a soft bright red, very firm, and will bear shipping and is a prolific bearer. The Philadelphia is a purplish red, immensely productive, being larger than the Kirtland, but too delicate for shipment, but for home use it cannot be excelled. Both of the last mentioned berries withstand the rigors of our northern winters.

Blackberries.

We have never had any success in raising this fruit. We have tried the Lawton, Wilson, and Kittatinny, and I have found the seasons few and far between when they would not each and all kill down every winter in this latitude. For this reason I have given this fruit very little attention. Frank Ford, of Ravenna, Ohio, is sending out this season a thornless blackberry, which he claims is as hardy as the oak, which he has named the Hoosac Thornless. It was gathered while growing wild in connection with other vines upon the Hoosac mountains in Massachusetts, and is undoubtedly a choice seedling. The testimonials which Mr. Ford produces are numerous, and from reliable persons. If this berry is what it is represented to be, it will be a godsend to the States situated in the more northern latitudes. Those persons who design to put out blackberries this spring would do well to send to Mr. Ford for his circular, in which he gives the certificates of several of the leading pomologists of the country, also his prices for plants and roots.

Gooseberries.

Houghton's Seedling is the standard berry for me. It is reliable, never mildews, and is of good size, and occupies the same relation to the gooseberry family that the Wilson Albany does to the strawberry family. My advice would be not to fool away any time in looking for something better.

Grapes.

Among the grapes that have been scattered broadcast over the land, the Concord stands A No. 1, and fully meets the expectation of all who cultivate it. Get that and you have a standard grape that you can rely upon. There are other grapes that are not to be overlooked in making your selection. The Delaware is a very choice market grape, and is sought after more than any other; clusters small and compact, color reddish purple, sweet and luscious; get it by all means. That and the Concord ripen about the same time. For earliness the Eumelan stands at the head; ripens about the 25th of August, and is a very fine early grape. The Martha is what is termed a white grape, with a greenish tinge, and ripens in this climate about the first of September; a very sweet, early, choice variety.

But the grape that is destined to secure the attention of the horticulturists of this and other States, is known as the Owosso grape. This, undoubtedly, is a chance seedling. We are forced to this conclusion from the fact that a *fac simile* of the grape cannot be found, although diligently sought after. This grape is now being propagated by Mr. Charles F. Goodhue, of this city. The Owosso grape has a bluish tinge, clusters large, well shouldered and compact, being very large sized and sweet. It has been supposed by some that this grape resembles the Salem; perhaps in flavor and size it might be said to resemble that grape, but not in any other respect. The Owosso grape is a very thrifty grower, never fails to yield an abundant crop, and will stand the winters of this climate as well as the Concord. The Salem with us has the opposite of all these good qualities. From our knowledge of this variety we believe it is destined to stand at the head of the list of choice grapes. Mr. Goodhue, who has the control of this grape, is a young gentleman of sterling integrity now engaged in this city as a horticulturist and florist. I understand that he has not been able to supply the demand, but hopes another season to answer all orders promptly. In addition to the good qualities of this grape already mentioned, it is a non-sprouter, or free from suckers, and a very late keeper, specimens of the same having been kept as late as January 15th; when opened they were as fresh and plump as when taken from the vines. This grape ripens a week or ten days earlier than the Concord.

TUESDAY.

The forenoon session was opened with prayer by Rev. G. M. Reynolds and singing by the choir.

Dr. Miles, of Lansing, gave a highly interesting address on "The External Forms of Animals as Indicative of Internal Qualities." For an abstract of the Dr.'s remarks on this subject see record of Lansing Institute.

Mr. Abel Beers followed with some very sensible extempore remarks relative to water for animals, arguing that it is just as necessary to have pure water for dumb animals as for mankind. He deprecated impure water from swamps, etc., as just as detrimental to dumb beasts as to man. He would prefer a farm without a bit of water above ground if of swamp drainage. His animals that drink

only well water are healthier. He has a windmill to pump water from a well for his stock, and the animals do not stand and drink and shiver. The animals should have water that they can get at to drink when they are dry. Animals do not drink for fear they will be thirsty, but because they are thirsty. His animals do not stop to drink at ponds, and they are healthy.

He ascribed many of the diseases of farm stock to impure water of swamps, irregularity of watering, or insufficiency of water. When animals are long without water they are likely to drink too much when they do get it. His policy is to provide water so that his animals will get it when they want it, and he does not believe in forcing them to go long distances, through winter storms and over ice, perhaps, to get water. Under such conditions they often go a long time without drink rather than expose themselves to the storm or risk themselves on the ice.

Mr. Beers' remarks were listened to with the most profound attention, and when he closed, the applause indicated high appreciation. In reply to inquiries he described his plan to construct water works to be operated by windmill.

The following paper on "Sheep," by Mr. Burlingame, was read by Rev. G. M. Reynolds:

"SHEEP."

The sheep as a domestic animal has been cared for by man since Abel kept his flocks on the Euphrates or Tigris more than five thousand years ago. As the reindeer to the Laplander, so sheep have been to others in all climes where it was practical to rear them. They furnished food to the epicurean as well as the hard-fisted yeoman; clothing to those in high places as well as to the poor and lowly among men.

The limits of this essay will hinder any lengthy discussion of the subject before us, or any display of book learning were it at our command on this occasion. What we say will be mostly on our own experience, without much of theory or speculative doctrine, hoping thereby to add our mite to the efforts of this Institute in the promotion of the interests of the farmers of Shiawassee county.

Perhaps it will not be amiss if we speak in short of some of the breeds or families of sheep that have been introduced into this country before we come directly to that with which we have had most to do.

In 1793 Spanish merinoes were first introduced into the United States. The first lot were all converted from sheep to mutton. About the beginning of the present century other sheep of this breed were brought over which were kept and cared for with great profit to the owners. In 1810 Mr. Livingston sold full-blood wool unwashed for two dollars a pound, while imported merino rams sold for \$1,000 apiece.

The tariff on wool in 1824 gave an impulse to the production of fine wool, and about this time were large importations of Saxon merinoes to the United States. On account of the fineness of the wool for a time the Saxon breed seemed to have the preference, but the hope of the owners were not realized, and finally an ad valorem duty on all wools was a death blow to the Saxons.

We come now to speak of the American merinoes established as a variety, and first the mixed Leonese or Jarvis merinoes. They were derived from a mixture of five families of Spanish sheep, the Paulers being in excess in numbers. These sheep were sought after and were in great esteem for a long time, but merged into other families, which we notice in this, namely: the Atwood

merino and the Pauler or Rich merino. The Atwood had its origin in Connecticut, and when after the downfall of the Saxon the Spanish came into favor the Atwood became a great favorite, and colonies from the original flock were taken to various States of the Union. Mr. Hammond, of Vermont, has improved this family more than any other man; indeed it is claimed for him that for the American merino he has done as much as Mr. Bakewell among the long-wooled sheep of England. In a flock of 200 the average yield of unwashed wool is ten pounds per head. The celebrated ram "Sweepstakes" has yielded in one fleece of unwashed wool 27 pounds.

The Pauler or Rich merinoes have flourished in Vermont, and down to the present time may no doubt be found at the old homestead in Shoreham. In 1840 they were described as heavy, short-legged, broad animals, full in the quarters, strong-boned, with thick, short necks and thick, coarse heads.

Later importations of Spanish breeds and of various English breeds might be dwelt upon, but we pass on to speak of our own experience with sheep. Those of the Pauler family have been our favorites, and of them we purpose chiefly to write at present. An experience of twenty-five years, we trust, will go some length in our favor in what we may present to the Institute. By careful breeding and keeping my flock has improved in form, constitution, and length and quality of wool. The average yield of this is ten pounds per head unwashed for ewes, taken off about the first of May. Qualities are a white and long staple, three-fourths of which is delaine wool.

My manner of breeding has been varied, in and in, and at times going outside of my flock when an object was to be attained, notwithstanding the many popular errors afloat in regard to breeding in and in, and also the fact established by physiologists relative to the degenerate condition of leading families of the human race who have intermarried with each other. Where we have perfection, or an approximation thereto, in form and a good constitution, this course is followed with success. Our own experience in this has given uniformity to our flock, and satisfactory improvement in general conditions. Special points present themselves which must be met by going outside of one's flock, such as length of staple, compactness of fleece, or covering of head and legs.

By a careful discrimination in the selection of bucks and in the rejection of indifferent ewes, we have done much in bringing our flock to its present condition. In selecting bucks we take those with compact, heavy bodies, short legs, and short neck and short head, with large nose.

In relation to a certain class of ewes, the knife or any other laudable means of relief must be used, or failure follows. I refer to those with slender nose, fine boned limbs, and small feet. These all denote a weak and feeble constitution, and must be put beyond the fold, or severe penalties follow.

Some items may not be amiss relative to points indicative of good breeding. One farmer seeks for a heavy fleece, thinking he has an approach towards perfection; another admires a profusion of wrinkles as the proof of improved grade, but neither of these conditions is conclusive evidence of what is sought after. Where wrinkles are numerous the wool is lacking in quality, the shearing more difficult, and the animal is not tough, hardy, or of good constitution. While upon this point we would add, although wrinkled sheep as such do not have a preference in our estimation, yet the sheep with heavy folds on the neck, increasing in size as they approach the lower part of the neck, show improved grade.

Many farmers suffer much loss, and some get wholly discouraged in relation

to keeping sheep on account of goitre in lambs. The conclusion is hastily arrived at that the locality, or the herbage, or something else is at fault, and the sheep are sold and shunned ever after as unprofitable servants.

While congenital goitre, or swelled neck with other conditions rendering a lamb worthless, may at times be found, we think much depends on the management of sheep in the hindering of this disease. Close confinement of the ewes in the winter season will help to bring on this condition in the lambs. Let the flock be moved about, have plenty of fresh air, fed—say forty rods from the barnyard—worked enough as a necessity, if not from choice, and the chances are that no goitrous lambs will put in an appearance. Such has been the experience of the Vermont farmer, and I am satisfied may be of the farmer in Michigan.

Mr. Benjamin Hulic: addressed the Institute on the subject of "Wayside Tree-Planting," in which he deprecated the stripping of the country of trees as extremely detrimental to crops, especially wheat, and urged upon farmers the importance of coöperation in setting out trees along the highways. In the report of this institute in the Owosso Press the editor makes the following appropriate remark in connection with this subject:

"It does not seem to be as well known as it should be that the laws of Michigan provide a compensation for planting trees along the road-sides by the deduction of a certain amount of highway tax proportionate to the number of trees planted. More general information on this subject should lead to more tree-planting, as it seems to encourage it, and in view of the direct compensation derived from the improvement, the law really provides a bounty."

Mr. E. L. Brewer read a paper on "Farmers' Poultry." He spoke of the little care and thought bestowed by farmers generally upon the raising of poultry or the profit of poultry, and gave a graphic description of the more common unclean poultry house and yard, and little cared-for fowls, and followed this with the statistics of successful, profitable poultry-keeping. Poultry must be cared for and tended as faithfully as other farm stock. He urged regular attention. He prefers the large breeds, would eschew black legs as less marketable for the table, but whatever breed be chosen, to make them profitable they must be regularly cared for and fed, and he specified the kind of treatment the fowls needed, feed, pure water, boxes of charcoal dust, large houses, roosts,—low for large fowls,—dirt floor, whitewash yearly at least, fumigation with sulphur to destroy vermin, etc.

AFTERNOON SESSION.

Prof. Beal read a portion of his paper on the "Apple Orchard." See lectures and addresses following this record of the Institutes.

The following paper was read by Rev. G. M. Reynolds on

"ROTATION OF CROPS."

The work assigned me in the discussions of this Institute is the presentation

of leading ideas and suggestions on the subject of "Rotation in Cropping and Manuring." I am impressed with the importance of the theme, and hope to be able to impart somewhat of my own interest therein.

Rotation means a going or turning around, as a wheel. Agriculturally it means that process or system in raising crops and enriching soils in which the farm is divided into a given number of plats or fields, and each in succession or rotation is subjected to the same process or order of raising crops and applying manures.

Now, whether such a system of farming is wise, or otherwise; whether it is based in scientific, *i. e.*, natural principle, or not, one thing is sure, *viz.*: it is seldom practiced. I am safe, I think, in asserting that ninety-nine one-hundredths of us Shiawassee farmers are wholly exempt from any of the disasters and liabilities to which this style of farming might expose us.

But why is not the rotary system of cropping and manuring a natural and scientific, and therefore a profitable and wise one? For if it is founded in nature's order it is scientific, and if really scientific it is wise; and if wise it is profitable, because agricultural wisdom means or ends in agricultural profits. Any of us Shiawassee farmers would indignantly protest against the imputation of farming for aught else but the unmixed profits.

Is rotary farming natural and scientific? Now, reasoning alone from the analogies of things, we shall be conducted safely and surely to the conclusion that it is. All nature's movements and operations are on the rotary principle. The blood in our bodies, from whence comes all physical life, nourishment, and support, moves and performs its indispensable functions on the circulating or rotary plan. The atmosphere that envelopes the earth and supplies so much that is necessary to organic existence and growth is prepared for, and does its grand work on rotary principles. The waters of the earth, also, are in perpetual rotation. Evaporation, condensation, and gravitation are nature's great levers, buckets, and troughs by which she lifts, throws down, and gathers again, in ceaseless rotation, this purified and prepared element of organized life. Or, looking out still farther into the wondrous operations of the creation for the analogies of our subject, we see the earth itself and all its associates in our planetary system, both primary and secondary, rotating away forever on their axes, and giving to their occupants the blessed products of night and of day. Another step outward into creation's depths, and we see all the bodies of our planetary set or system industriously and unceasingly rotating around their solar center, and bringing to each of these worlds the blessed seasons, with all their vast benefits and beauties. We take one more venturesome step into the profound of the infinite deep of creation in search of the last known link of our analogical chain, and we behold even the universe of stellar systems rotating, or appearing to rotate, around a common center in vast cycles of sidereal or equinoctial precision, bringing to the universe God knows what infinite and untold blessings.

Rotation, then, is the established order of nature. We cannot err when we say that rotary farming in theory and in practice has a scientific basis; reasoning only from the analogy of things, and omitting much of other scientific demonstration, other things being similar and equal, he must be the wisest and best farmer who arranges and carries forward all his farm operations on the principle of rotation in cropping and manuring.

But we shall be ready to inquire as to the special advantages of such a system of farm operations. The inquiry enters legitimately into this discussion. What

practical advantage is there in it, and what practicable ends are supposed to be reached by it? To these inquiries I suggest these inquiries, viz. :

1st. The system is favorable to the preservation and increase of the natural fertility of the soil. Every judicious course of rotation is accompanied with a judicious and uniform plan of manuring or enriching the soil by the regular and successive application of the entire manurial products of the farm as gathered from the stables, the stock yards, the henery, the ash-house, etc., and to this is added, at least once in each going around, the important addition of a good, and an increasingly good, grass or clover sod, by ploughing down, to largely contribute to the fertilizing elements of the soil. No farmer that pursues his avocation with enough interest and intelligence to adopt and carry out a system of rotation will fail to see to it that the manure question enters largely into all his calculations and measures.

2d. A second advantage that grows out of the rotation system is its tendency to render more uniform the fertility of the several fields and thus to equalize the annual returns from the farm. If there is a difference in the fertility of the several divisions, as there is in most farms, and it is the uniform practice to apply the whole available enriching products to each field as it comes in its order of rotation, then it is easy to perceive that an equalizing process is going on that will eventually reduce the farm to an area of uniform productiveness, and thus greatly aid in returning to the farmer uniform annual results of his labor.

3d. Another advantage which results from this plan of working the farm is the excellent opportunity which it brings around of effecting repairs and improvements. When we start the rotation in any field as it comes in its order there is a degree of interest naturally attaching to that point of operations, just as an ambitious boy feels at the head of the spelling class, and it is comparatively an easy matter then to lay down drains, repair fences, fix the gates, remove obstructions to the plough and mower, or do whatever else can and should be done in the way of bettering that field and fitting it for more satisfactory work and returns. At another time it would not be quite so easy to do the same things, especially if this was an understood part of the system.

4th. I think, furthermore, that the rotation system of farming is favorable to the destruction of weeds and noxious insects. In the year or years in which a given field comes under vigorous and cleansing tillage, as it will in every good plan of rotation, an excellent opportunity is again presented of making weeds and injurious and unsightly plants diminish their miserable standing armies. Insects, destructive worms, and grubs, I believe, regard with abhorrence even greater than many farmers, do all approaches to a system of farming that regularly and thoroughly and uniformly disturbs their haunts and operations.

5th. To these greater advantages of the rotary plan of farming, I think I may add one or two that are lesser, and still not to be forgotten, *e. g.*, this way of managing the farm obviates all perplexity and calculating as to what is to be done, or the manner thereof. A plan of rotation once arranged and begun, we go forward each year in the predetermined course and know precisely what field, what crop, and what business will be in hand as each month and season comes in its order.

6th. And then I think that the rotary plan increases the pleasures as well as the profits of farming. I do not mean the pleasures of profits, particularly, but rather the satisfaction that comes from the consciousness of doing things in a systematic and orderly way. It is akin to the pleasure which we all experience when we look upon the beautiful motions and useful results of a finely adjusted

system of mechanism. It makes the farmer feel more as though he were the intelligent directing head of his beautiful and useful machine, and less like the sods and the clods which he manipulates.

Perhaps you will ask how all this accords with experience, or whether my views and utterances are mere theorizings and speculations, or the results of personal experience. If such a question arises, I answer that these are the demonstrations of my own experience. I have been following a plan of rotation in cropping and manuring a farm long enough to have completed three or four revolutions in my farming course, and every reason which I have presented as to the wisdom of systematic agriculture is fully justified in my experience.

What plan or course of rotation is the best? That depends wholly on circumstances—the character of the farm, the nature of the markets, the leading interests, whether stock, grain, etc.; and here if where the wisdom of the farmer will exhibit itself, in settling this question of leading interest. Once settled, and other things considered, the rotation is easily arranged. In my own plan, stock is the main interest, and grain subordinate. To secure my end, I give half my little domain to clover, a fourth each to corn and wheat. I put all the manure on my clover sod, turn it down and plant with corn, seed it to wheat, without plowing, stock to clover, harvest once for hay and once for seed, pasture one year, then start again.

What particular benefits accrue from this particular course of rotation? To this I answer:

1st. It is short and simple;

2d. It reduces plowing to the minimum quantity. I plow but once for the entire course;

3d. It reduces the cost of seeding to the smallest value;

4th. It alternates the crops so that no similar ones come twice in the same course—an important consideration;

5th. It arranges so that the corn, which is a coarse feeder, takes the first turn at the crude, fresh manure, and the wheat which follows—a more delicate feeder—draws on the better prepared viands;

6th. As I sow nothing but clover for stocking down, it makes of this plant a great manural and sub-soiling agent;

7th. As I feed my entire crop of clover, corn, and fodder on my farm, and use the whole of my wheat and clover straw for absorbants and litterage about my stables, pens, and yards, making and applying a comparatively large annual amount of manure, I cannot see why this system will not ensure a constantly increasing fertility in my soil, and an annually increasing margin of profitable productiveness—a theoretical inference which exactly tallies with my practical experience.

And this, Mr. President and gentlemen, is all that I have to offer on the subject in hand.

Next was read the following paper on the same subject by Mr. A. H. Owens:

MR. PRESIDENT, LADIES AND GENTLEMEN:—There has been so much written and said about the rotation of crops by men of letters that it might be considered at first thought to be useless for one whose life has been spent among the brush, or at the heel of the plow, to attempt an improvement upon the subject. But when we take into consideration that each writer has written from his own locality and from his own standpoint, which, considering latitude, climate, and soil, may be a good one, we think, living as we do in central Michigan, that we may adopt a system of rotative farming that will greatly increase

the fertility of our lands, and at the same time be far more remunerative than any plan that we have read from the pen of our predecessors. The arable soil of our lands is variable, but clay predominates in the subsoil, with a mixture of limestone, gravel, and many other ingredients, and under proper management our lands are well calculated to produce a good crop of any of the cereals or grasses usually grown in this latitude. In order to bring about a rotation, according to my ideal, it would be necessary to have the farm divided into seven or more fields of equal dimensions, as near as may be, other conveniences considered. First, I would plant corn upon the oldest meadow; second, oats or barley; third, pasture; fourth, summer-fallow; fifth, it would be in wheat; sixth and seventh seasons, meadow. I would put the largest half of the manure made upon the farm on the corn ground before plowing, and plow a wide furrow and not more than five or six inches deep; then plow a little deeper for oats or barley, bringing upon the surface the decomposed sod and manure, which will insure a good crop of oats or barley, and aid in starting the young clover, which should be sown immediately after the grain is harrowed in and followed with the roller. Then sow timothy on or before the middle of the following September and not pasture until the next summer, when it would produce a large amount of feed for stock. Fourth, summer-fallow.

Now, Mr. President, comes the great secret of success that will be sure to follow for the next seven years if properly carried out. We have gathered from the great book of nature and from experience certain principles that we can not lose sight of in writing out our views. It was a law among the Israelites to sow their land six years and gather in the fruits thereof, but the seventh year should be a year of rest. We find that the same law holds good in regard to the productive capacity of our lands, that it needs one-seventh part of the time for rest. While some farmers claim that land receives all needful rest while in meadow or pasture, others think that the common mode of summer-fallowing by plowing at any time at their leisure, and then after harvest to harrow down and cross-plow is sufficient. I claim that in order to bring about the great desideratum that it should pass one season in eight without producing grass or weeds; that it should be plowed as deep as the soil would admit, or about seven or eight inches, and as early in the spring as practicable after the ground becomes dry. The harrow should be passed over the ground immediately after the plow, when it will pulverize easily, and the harrow and cultivator should be used as often as every two weeks until August. The balance of the manure not previously used may now be spread over the dry knolls and barren places; then cross-plow in narrow furrows and harrow down thoroughly, when it is ready for the third and last plowing. This third time plowing buries all of the half decayed sods and lumps, leaves a fine, moist surface for the wheat, brings the manure on top, makes a perfect surface for meadow, which can be used as such for the next two years. By thus thoroughly mixing and bringing every particle of the soil to the surface in a condition and at a time when it will receive the greatest benefit from the æriform fluids will, in our opinion, be of more value to the routine of crops during the seven years than the plowing under a green crop. Whenever we have carried out the above rules we have been blessed with excellent crops.

The good house-wife may not be able to describe minutely the chemical changes that takes place in the making of bread, but she does know by experience when to apply the yeast and when to apply the heat in order to succeed in producing a good article. So with us, as farmers; we do know that a certain

procedure in the tilling of the soil will produce certain effects, and now what we want is to have these learned professors explain to us what these chemical changes are, and how we can manage to derive a greater benefit from them, so that we may go on to a higher degree in the path of usefulness and improve upon that calling which we have the honor to represent.

DISCUSSION.

Wm. Leonard.—Have you always practiced the rotation laid down in your paper?

Mr. Owens.—I have not in every case. I have been trying for several years to get my farm divided into suitable fields for that purpose.

Sec'y Baird.—I like the idea of one-seventh part of the time for rest, for I enjoy rest on Sunday. But what evidence have you that a thorough summer-fallowing once in seven years will produce a chemical change in the soil?

Mr. Owens.—I came in possession of it many years ago by reading agricultural papers, and my own experience and observation has converted me to that belief. It also destroys all kinds of worms and insects that may be in the ground, and purifies it from the seeds of the foul weeds that have been accumulating for several years previous, and I wish to leave a further explanation to these learned professors.

Mr. ———.—Why do you recommend a wide and shallow furrow for corn?

Mr. Owens.—I plow a wide furrow in order to turn the sod flat or bottom up. A narrow furrow generally leaves it standing on the edge or laps it, which causes more labor to keep the grass and weeds down.

Mr. ———.—What kind of plow do you use for plowing corn ground?

Mr. Owens.—A long, three-horse plow; one that will turn a wide and at the same time a shallow furrow. All plows will not do it.

Mr. Leonard.—Are you ever troubled with cut-worms?

Mr. Owens.—Sometimes, but not so much as formerly.

Mr. Leonard.—How do you prevent it?

Mr. Owens.—By getting all my other work done or out of the way before commencing my corn ground; then plow, harrow, mark, and plant as quick as possible after I commence.

Dr. Miles.—I do not understand how you can give your land one-seventh part of the time for rest by the rule laid down in your paper?

Mr. Owens.—I do not; but I summer-fallow every eighth summer, which will answer every purpose.

Mr. Leonard.—Do you approve of fall plowing?

Mr. Owens.—No, not on our land. My experience is that it injures or wears out our land as much as it would to take off a crop of grain; but I am informed that they fall plow in the eastern States and Canadas with good results.

Mr. ———.—Do you subsoil your land?

Mr. Owens.—I subsoiled one field of eight acres about ten years ago, and I saw a marked improvement in the crops for several years after.

Mr. ———.—Do you approve of subsoiling?

Mr. Owens.—If I had a farm with a strong clay subsoil, and tolerably free from stone, I would subsoil it once during the rotation.

Mr. ———.—Why do you not subsoil your land?

Mr. Owens.—Unfortunately for me the subsoil of my farm is very stony, and as I have cleared off the surface stone, I do not like the idea of bringing to the surface a second crop.

Secretary Baird.—Do you not think that clover draws sufficiently from the subsoil?

Mr. Owens.—I do think that clover does draw largely from the subsoil, but I do not like to depend too much upon clover, for land may become clover sick. I would rather alternate with timothy.

An inquiry relative to the destruction of Canada thistles was responded to by Prof. Ingersoll, who said they may be destroyed by keeping them below the surface by plowing them under, burying with straw and cutting the thistles down. Putting salt on them and letting sheep feed on them will destroy the pest.

Thorough cultivation will kill quack grass and milk weeds. Going over a patch of Canada thistles every few days with a cultivator through a season is sure to kill them.

Dr. Miles gave an unwritten address on the subject of "Stock Breeding." He claimed that the good breeder must have good judgment, a good eye, and pursue his system unvaryingly, with his ideal always in view. That the character of the parent is transmitted to offspring, is attested by the peculiarities of different families, species of animals, etc., that have come down to the present through long lines of generations. Breed only from such animals as possess the character you want to perpetuate. The Doctor in this connection discussed in-and-in breeding, stating at the outset that he had yet to learn that it was dangerous or injurious, and he controverted the idea of danger and injury by statistics of insane and idiotic asylums where investigations had shown that not a single case had resulted from consanguine marriages.

The improvement of animals may be effected by changing the habits. The gait of the trotting horse is acquired, and this trotting character has come to be transmitted from prepotent parent to offspring, as in the Hambletonian breed of horses. Other instances of change of habit resulting in change of character were mentioned.

In response to an inquiry, Dr. Miles said the best beef-producing animals are poor milkers, as the short-horns. The combination of good beef producer and good milker will depend much on the care. The Galloway, he suggested, came nearest this character.

Prof. Gulley's name was on the programme for an address on "Underdraining," and considerable disappointment having been expressed because there had been no discussion on the subject of drainage, Prof. Ingersoll was called for. That gentleman appeared on the platform and made some interesting remarks on this subject, first showing that underdraining does pay. An engineer should be employed to insure good outlets where it may be difficult to determine without engineering. The drain should be laid so as to avoid very deep digging. The benefits are that in the case of land too wet to get on to early in the spring, you may gain several days' time. When land is wet, and therefore cold from evaporation, drainage renders the land warmer and less liable to frost. Drainage too makes the soil more porous,—more workable. A large size tile is deemed preferable; it must be put down so that the fall will be uniform; use only circular tile well baked. Stone will not answer as well as tile. The collar he considered about superfluous. On level land place the lateral drains thirty-five feet apart, three feet deep. As to fall, he said they had one drain that works satisfactorily with only one-tenth of a foot fall in sixty feet. A fall of one inch in four rods is sufficient.

Adjourned till 7 o'clock.

TUESDAY EVENING SESSION.

After singing by the choir Prof. Geo. T. Fairchild delivered the following address on

AGRICULTURE IN OUR LITERATURE.

Agriculture in literature, literature and agriculture, what have they in common? Such has been the questioning of many an earnest farmer, and of now and then an earnest educator in the years since the possible union of "learning and labor" has attracted attention. Said a college mate to me when told of my professorship, "What has a professor of English literature to do in an agricultural college?" and his question has been echoed again and again by people who, like him, are neither farmers nor literary men. You can see, then, the thought which has suggested the theme for this address, and will allow me to appear as champion for both literature and agriculture, hoping to show on the one hand that literature, through all the centuries past, has never let us lose entirely the true ideal of tillage by hands and brains alike, and has kept up in places where it might otherwise be lost, a love of rural pursuits; and to show on the other hand that agriculture in all its varied forms has given some of the most vivid pictures, the loftiest themes, and the truest inspiration that our literature affords.

There has been a too common impression that men of culture, whose "pen is mightier than the sword," looked down upon that employment first in order of time and first in importance for nourishing every faculty of the race. The fact is that the farm and farming have stood in the poets scale next to, and blended with, heroic deeds and tales of love, as nearest to those universal affections which valor protects and love exhibits. Even philosophers have counted it worth their while to bring their speculations into use upon the same subjects, while their ideals of state and society have embodied in first rank high culture of the soil and of its sons. The proof you can get only by searching in the works of these same poets and philosophers. Shall we spend a half hour in the search? If I give most time to the poets it will be, first, because they are most in my line; and, second, because they are likely to be most ignored in substantial study and left to the lighter hours of recreation.

You will expect me in treating of our literature to pass by hastily those old classics that have for so many ages set the fashions for the world, and to confine investigations to that which is peculiarly our own from being written in our mother English. Yet, since those classics have set the fashion, a glance at their outlines may not be out of place.

Homer, in all his grand array of Grecian forces battering the walls of Troy, did not forget to picture the farm, with its herds and flocks, and the garden, thrifty with tree and vine and laden with fruit. To him we owe almost the very names which grace to-day our talk of nature's forces. They seemed to him active beings, with a character. Ceres, Flora, and Pomona, so familiar to us, though Roman names, gain much of their significance by being identified with some of Homer's goddesses or nymphs.

Hesiod you all have heard of, whose poem, "Works and Days," goes into the minutiae of farming, and that, too, for the humbler affairs of plowing and sowing, as well as for the richer gathering in of the harvest. His system of farming, if system he had, may serve us of to-day but slightly; yet the same

maxims still thrive upon his native soil. He was brought up in the rich fields of Boeotia, the best farming region of Greece. Is it a mere coincidence that this same region, according to Greek legend, is the birthplace of lyric poetry and the very home of the muses? Or has the very nature of a luxuriant vegetable growth, with all its attendant blessings, a charm for the human soul which calls for utterance in the flowing numbers of the poet's song? Pindar, the master of the ode, grew up there and gained there the inspiration that makes his fame last till now. It is even supposed that rural life called forth his powers, and rural festivals were the occasion of his verses.

The very origin of the drama is traced by its names to the country festivals in honor of Dionysus, or Bacchus, god of wine, the story of whose exploits, grave or gay, in traversing the world to introduce the culture of the vine, grew into the well known tragedy and comedy.

But let the ancient poets pass, with many a phase of country life immortalized by their bright pictures. We can scarcely stop to dwell on *Virgil*, whose Phyllis sets her cap for country swains in a hundred imitators to our own times. And yet his eclogues and his georgics might interest, perhaps instruct, the best trained husbandman among us. He certainly did not despise the farmer's lot.

Perhaps we cannot do better right here than to bring up our English Thompson, author of "The Seasons," as witness both to Virgil's thoughts and his own sympathy with country life. See how he turns a passage in Virgil to account in his "Autumn:"

"Oh! knew he but his happiness, of men
The happiest he, who far from public rage,
Deep in the vale, with a choice few retired,
Drinks the pure pleasures of the rural life!
What though the dome be wanting whose proud gate,
Each morning, vomits out the sneaking crowd
Of flatterers false, and in their turn abused?
Vile intercourse! What tho' the glittering robe
Of every hue reflected light can give,
Or floating loose, or stiff with mazy gold,
The pride and gaze of fools! oppress him not.
What though from utmost land and sea purveyed
For him each rarer tributary life
Bleeds not, and his insatiable table heaps
With luxury and death? What though his bowl
Flames not with costly juice; nor sunk in beds,
Oft of gay care, he tosses out the night,
Or melts the thoughtless hours in idle state?
What though he knows not those fantastic joys
That still amuse the wanton, still deceive,
A face of pleasure, but a heart of pain;
Their hollow moments, undelighted all?
Sure peace is his, a solid life, estranged
To disappointment and fallacious hope;
Rich in content, in nature's bounty rich,
In herbs and fruits; whatever greens the Spring
When heaven descends in showers, or bends the bough
When Summer reddens and when Autumn beams,
Or in the Wintry glebe whatever lies
Concealed, and fattens with the richest sap,—
These are not wanting; nor the milky drove
Luxuriant, spread o'er all the lowing vale;
Nor bleating mountains; nor the chide of streams,
And hum of bees, inviting sleep sincere
Into the guiltless breast, beneath the shade,
Or thrown at large amid the fragrant hay;

Nor aught besides of prospect, grove, or song,
 Dim grottoes, gleaming lakes, and fountains clear:
 Here, too, dwells simple truth, plain innocence,
 Unsullied beauty; sound unbroken youth,
 Patient of labor, with a little pleased,
 Health ever blooming, unambitious toil;
 Calm contemplation, and poetic ease."

* * * * *

"This is the life which those who fret in guilt
 And guilty cities, never knew; the life
 Led by primeval ages, uncorrupt,
 When angels dwelt, and God himself, with man.

So Virgil, who sang of Rome's foundation, the loftiest theme to Romans, found nothing low in country life, and spent some of his best energies in picturing to his noble patron, Mæcenas, its toils and trials with its joys. Minute directions for successful care of lands, of crops, of horses, bees, or bees seemed not beneath the notice of the first poet in the most literary age of Rome.

Horace, a contemporary, dealt more with social life, with feasts, and city manners; yet his love for country life is ever showing itself enough to suggest his fitness to enjoy the farm which Mæcenas gave him in recognition of his talents.

But the poets were not the only cultivated men among the ancients who found their thoughts drawn toward agricultural pursuits.

Philosophy was in those days mostly confined to speculation upon the obscurer methods of nature, often far from the truth, and further from any practical life. Yet agriculture was quite as near the thoughts of philosophers as any of the arts. Socrates, to be sure, the most practical of them all, was busied with the morals of city life and politics. Yet Xenophon, one of his favorite pupils, and the most finished of Greek prose writers, makes Socrates give the sanction of his voice and methods to a treatise on the garden, the farm and the rural household. Thus does he exalt these every-day affairs beside the highest thoughts upon the soul's immortality. Then Cato, that "noblest Roman of them all," who learned the Greek language at 80 years, gave his name to a treatise that is still studied.

But I have kept you long enough among the ancients, and will not name another, lest the attractions in those old masters detain us from the fresher and more abundant stores nearer home. If any wish to pursue the subject further, or to trace agricultural writings through the early centuries in Europe, "Wet days at Edgewood," by Donald G. Mitchell, will give you an index, with now and then a delightful glance that may lead you to still deeper researches in a well furnished library. The same book may help us too, in our search through English literature.

It might be easy and pleasant to trace a train of similar sentiments through five centuries of English poetry, from the notable Frankelin, the ploughman, and the country parson of Chaucer, to the simple "Betsy and I," of a Carleton; but the experience of us all is enough to confirm the general statement of its presence. I purpose to do more and less than this a little,—more, in classifying somewhat the various ways in which men of literary culture have tried to help agriculture; less, in taking samples only, wherever they occur most available, without trying to give a complete list of authors, or their works. Of here and there one, I shall try to give some idea in slight detail and very meagre quotations.

Let us begin with the most obvious, though not always the most effective,

efforts to benefit farming,—the definite treatises upon one or more of its many branches. I would not, if I could, give you in this connection a list of agricultural writers, nor a criticism upon their merits as teachers of husbandry. That belongs to another purpose and to other hands. I wish only to show how literary art has lent its graces to the subject with no stinted hand.

Fitz Herbert, the first writer in English upon this subject, was a learned lawyer, an orator, and an author, before he touched his "Treatise for all Husbandmen," that has had more than twenty editions. Thomas Tusser, whose "Five Hundred Points of Good Husbandry" professes to be a poem as well as a systematic calendar for the year's work upon a farm, was a musician, a man of general culture, and a little of a farmer (for he failed in this calling again and again), yet he grew wise enough to throw into his jingling rhymes a deal of earnest advice that has preserved his work for three hundred years, and given him rank as the first didactic poet. I should like to retail for you a little of his good advice,—as good now as in his day,—on many a matter of every day experience, but I must stop only to show the spirit of his undertaking:

"The fence well kept is one good point,
And tilth well done in season due;
Yet needing salve in time to annoint
Is all in all, and needful true;
As for the rest, thus think I best,
As friend doth guest,
With hand in hand to lead thee forth
To Ceres' camp, there to behold
A thousand things as richly worth
As any pearl is worthy gold."

That he loved the country, he proves by his wishes:

"Yet will I not despair
Through God's good gift so fair,
Through friendship, gold and prayer,
In country again to dwell;
Where rent so shall not pain me,
But pains shall help to gain me,
And gains shall help maintain me,
New lessons more to tell."

Hear but once more of his own good intentions:

"What lookest thou herein to have?
Fine verses thy fancy to please?
Of many my betters that crave,
Look nothing but rudeness in these."

"What other thing lookest thou then?
Grave sentences many to find?
Such, poets have, twenty and ten;
Yea, thousands, contenting thy mind."

"What look ye; I pray you show what?
Terms painted with rhetoric fine?
Good husbandry seeketh not that,
Nor is't any meaning of mine."

"What lookest thou; speak at the last?
Good lessons for thee and thy wife?
Then keep them in memory fast,
To help as a comfort to life."

You might be amused for the evening by his quaint and earnest maxims from the "Ladder to Thrift," his enumeration of "Husbandly Furniture" in more than twenty crowded verses, or the calendar of duties for the farm and the household, and some might even be enlightened by the bachelor's debate over "Wiving and Thriving," but it is all included together in a single verse from "September's Husbandry":

"Good farm and well stored, good housing and dry,
Good corn and good dairy, good market and nigh,
Good shepherd, good tillsman, good Jack and good Gill,
Make husband and housewife their coffers to fill."

We might have here a score of names with interesting particulars from each author's works, but it serves my purpose merely to mention a few. The great Lord Bacon wrote essays on the garden, for beautifying home, and for its comfort; and is credited with having started the idea of experiment in farming. The learned Hartlib was among the first to express that which now finds utterance everywhere,—“the mystery of farming,”—and projected an agricultural college as a means toward solving this “mystery.” The highly cultivated and voluminous author, Evelyn, found time for treatises on field and forest, the last, his “*Sylva*,” having been the standard for a century or more, and still being needed in every well furnished library of agriculture. Jethro Tull, whose name is familiar to all students of agriculture, was trained in the university and the law school before he made his “Prosperous Farm” famous for its experiments in tillage. Even the philosopher Locke left his speculation upon the human understanding and his theory of ideas to give directions for the culture of vines and olive trees in England. Lord Kames, everywhere known as the elegant critic of literature, wrote a work on farming, to which he brought the same independent judgment that characterizes the *Elements of Criticism*. Burke, the famous orator, found time to write some excellent thoughts on farming, saying by way of appreciation, “It requires ten times more of labor, of vigilance, of attention, of skill, and, let me add, of good fortune also, to carry on the business of a farmer with success, than what belongs to any other trade.”

Perhaps I need not bring this glance at the work of leading authors in agriculture any further down the centuries, for within a hundred years there have arisen a host of earnest students of nature in this field, who like Cobbett and Loudon have dealt in experience, or like Davy and Liebig have sought to dig deeper into the mystery than maxims can take us. Within two hundred years the agricultural journal has grown from nothing into a systematic, scientific treatise.

But all along this way of progress there have been another sort of treatises on farm matters. Those I have just referred to are the solidier work of the solid men. These are the work of would-be poets, lovers of rural pursuits, and friends of the farmer.

Spenser's “*Shepherds' Calendar*,” often referred to, though it bears the name, has scarcely the merits of a treatise on sheep raising; it is less instructive than poetical. Such indirect tributes to the farm are abundant. Many are more direct, like Herrick's *Ode to Country Life*. Still others describe means and methods. Cowley gives us “*The Garden*,” of some merit. John Phillips' lengthy poem on “*Cider*” begins with the apple tree and orchard, and ends with the jovial influence of its cheering juice. Corbet sets forth “*Country Life*” with its blessings. Dyer has “*The Fleece*,” in four books, to encourage

sheep husbandry and manufactures. Shenstone, in his "Rural Elegance," exhorts to an appreciation of the beauties of nature as they surround the farmer. Dodsley wrote a poem on "Agriculture" proper, and Wm. Mason pictured "The English Garden" in a way to gain some credit for his knowledge and his gifts. Ambrose Phillips devotes most of his poetry to country life in all its phases, even the humblest, saying by way of preface, "To view a fair, stately palace strikes us indeed with admiration, and swells the soul with emotions of grandeur; but when I see a little country dwelling advantageously situated amidst a beautiful variety of hills, meadows, fields, woods, and rivulets, I feel an unspeakable sort of satisfaction, and cannot forbear wishing my kinder fortune would place me in such retirement." His poetry breathes throughout this same full zeal for country life and manners. "The Farmer's Boy" of Robert Bloomfield, and the "Village Minstrel" of John Clare, though not exactly in form of treatises on farming, so abound in minute pictures of farm life and manners as to answer the same purpose.

These two farm lads turned poets did for English country life what Allan Ramsey, and Robert Burns, two other farmer poets, have done for the Scotch,—gave the glow of their enthusiasm to common things. Just hear a word from Bloomfield:

"The farmer's life displays in every part,
A moral lesson to the sensual heart.
Though in the lap of plenty, thoughtful still,
He looks *beyond* the *present* good or ill,
Nor estimates alone *one* blessing's worth,
From changeful seasons or capricious earth,
But views the future with the present hours,
And looks for failures as he looks for showers."

Thus he extols the thrifty farmer's foresight, and follows with descriptions of the turnip sower watching the clouds that shall water his ground to insure a crop, of the wheat ear gradually developing and changing its color till ripe for the harvest, of the "sweeping scythe" and "sturdy mower" through the joyful hurry of haying. All this is more useful than a scientific treatise, if it makes a man love his work.

This leads us gradually into writings of another class, not intended to give direct lessons in either the art or the morals of farming, yet perhaps even more effective in lifting into notice and interest the home life, and hence the thrift of the farm. When our Saviour wished to send his message of love to all hearts, he did it by linking the thoughts of his followers to the every day affairs of life. He leads us to the wheat field and the meadow, and the fisherman's net; to the sparrows, the lilies, and the grain of mustard seed. In the same way the English poets have sought their illustrations from common life, and have found the country with its wholesome surroundings of a pure and lovely *nature* the best for their purposes. Hence you can scarcely turn the pages of a single poet without glimpses all along of the innate respect he has for the thoughts which the farmer's life encourages. Now and then you find one whom the fashionable life of his particular age seems to have weaned almost entirely from mother earth; but to the most, the smell of the green leaves and the babbling of the brooks are a never ending enticement back to nature, that cannot be resisted. So we have those abundant and appreciative references to rural life,—its cares and its joys,—to farm methods and experiences which tell of faith, of hope, of liberty and trust to country wealth in broad acres, varied influences, stock of cattle, sheep, and swine; and in bounteous stores in barn, cellar and pantry; finally to the stalwart virtues of honesty and independence, fair dealing and

frank speaking, and the worship in God's own blue-vaulted temple "in spirit and in truth."

To refresh your recollection of these facts you have but to turn to any of the standard authors in poetry or romance. Go back to Spenser, or to Chaucer (if you want to spend a little time in learning his old English), and then trace down through age after age to our own Bryant and Whittier the universal love and use of rural scenery and rural life. If this is too great a task, turn to Milton's *L'Allegro*, or to a host of places in *Paradise Lost*; to Isaac Walton's *Complete Angler*, where he goes a fishing, not only for the fish of which he was fond, but for the "breezy main" and "cooling shade," and country wit and wisdom of which he was fonder. Read again Gray's *Elegy in a Country Churchyard*; glance over Thompson's *Seasons*; take Goldsmith, or Cowper, or Burns, or Wordsworth, or Scott, or Tennyson, or Mrs. Hemans,—all household names,—and with this question in your thought, feel for their interest in your home life. Even that well-remembered lullaby of Isaac Watt's might answer our purpose as an illustration.

Often these references expand into beautiful pictures which we take, perhaps, for the mere adornments of rhetoric: but any reader has missed the cream of poetry who has failed to find the *heart* in it, and this *heart* is what trains and moulds our feelings till they are developed into action.

The growth of landscape gardening in England out of the merest formality into an imitation of nature is supposed by excellent authority to have been due to the influence of Milton, Addison, and Pope, exercised entirely through literature. May it not be found upon careful scrutiny that the longing of this century for a stronger hold of the soil we cultivate, a better knowledge of our powers over it, and a fuller enjoyment of our God-given blessing in it, is due to the wider reach of the same and kindred influences through a more general acquaintance with such works in books?

But that the poets have been in earnest in their regard for country living is proved by numerous instances of life spent amid rural pursuits. Some of these, as rural poets, I have already named; others more noted can be added. Shakespeare retired from the stage to his farm. Samuel Daniel, laureate poet of the same age, spent his last days on his own farm. Edmund Waller, famous fifty years later, was possessed of great wealth by inheritance; and this he invested in a country place which became the fame of all the land for its beauty, variety, and fertility,—all through the taste of its owner. Alexander Pope spent all his spare change in beautifying his country seat, and in cultivating fine fruits and vegetables. Wm. Cowper spent nearly his whole life in the country, and found his chief satisfaction in his gardening, of which his poetry everywhere reflects the flavor. Robert Burns failed in his farming, not from want of knowledge or appreciation, but from want of application, inspired, as is too often the case, by the too frequent use of the social glass. Sir Walter Scott delighted in the care of his estate, and was well skilled in forestry and tillage, but was extravagant in its adornment and in his mode of living. Wordsworth passed most of his life in the country, as one of his critics says, "under the 'habitual sway' of nature." Southey and Coleridge, too, dwelt side by side for a time, and seemed to love their country home the best. Tennyson dwells in a suburban, "careless ordered garden" that he loves, and

"The fields between
Are dewy fresh, browsed by deep adder'd kine,
And all about the large lime feathers low,
The lime a summer home of numerous wings."

The country farm house home of Whittier seems familiar to us from his own stories and from its picture, that brightens so many of our walls throughout the land. The cities draw our men of literary taste only by their greater facilities for reference to the learning of the past. The love of country life is almost universal.

Now, I would not have it thought that every literary man has done his duty by farm life, or that all alike appreciate its character; I mean simply to show that it has gained fully its share of notice and kind regard; no other art begins to equal it. That some of the poets have chid the English peasantry for want of sense to appreciate their privileges, I grant, and too often they have deserved it: but the ploughman and the shepherd have held a place in the poet's respect from the very beginning. In one of the oldest English poems it is "Peter, the ploughman," and he alone, who sees the evils within and without the church from the seven deadly sins, and to whom all look for a remedy. Among Chaucer's nine and twenty pilgrims of all classes, the country gentleman is praised for hospitality; the country parson, for true following of his master, the great Shepherd; and the ploughman, the parson's brother, is of all the one who lives in peace and perfect charity.

"God loves he best with all of his true heart,
And then his neighbor rightly as himself."

A century later, in Skelton's verse, it is Colin Clout, the shepherd, who sees the evils of corruption and hypocrisy; and a century later still, the star of Elizabeth's court, Sir Philip Sidney, frames his ideal Arcadia among a race of shepherds. Indeed there is no end to the array of evidence that farming has not lacked the sympathy and active interest of literary men; the real difficulty has been to bring the tillers of the soil and these strong aids of his together. If the farmer has not felt the poet's lifting power, it is because he has not sought it, and often has not known of its existence. Why should he not, in this new era of social culture and of scientific lore, add every help that poets give toward loving and enjoying that wherein he labors? The poet's work in every calling is but just begun; the world is gaining now a second inspiration from the words of long ago. Let our sons and daughters learn the treasures stored for them in words of sympathy and cheer, in kind enticement to a fuller satisfaction in the work they do, and they will be, not merely contented with their lot, but proud to be not only "*lone and sinew*" for the race, but *brains and hearts* as well. The way is opening toward a liberal culture that should make us better *men and women*, as well as better farmers. With this to hope for, we can safely appropriate to ourselves the address of the poet Thomson to his countrymen:

"Ye generous Britons, venerate the plough,
And o'er your hills and long withdrawing vales
Let Autumn spread his treasures to the sun,
Luxuriant and unbounded! As the sea
Far through his azure turbulent domain
Your empire owns, and from a thousand shores
Wafts all the pomp of life into your ports.
So with superior boon may your rich soil
Exuberant nature's better blessings pour
O'er every land, the naked nations clothe,
And be the exhaustless granary of the world!"

So literature and agriculture, instead of being antagonistic, lift each other to a better, higher enjoyment and profit on both sides. Let this, then, be my

apology for being here to night, and pay you, if possible, for your kind attention.

Mr. Hartwell read a paper on "Apples" and Mr. John N. Ingersoll gave an address on the "Triumphs of Mind."

At the close of Mr. Ingersoll's address Rev. Mr. Reynolds rose, saying that since the committee had made no provision for an expression of thanks, he begged to constitute himself a committee to propose unanimous thanks, first to the committee for liberal preparations; second, to citizens of Owosso for hospitality; and, third, to the professors of the Agricultural College for what they had done here to promote improvement. The large audience rose upon request of the President, to express by their votes in this manner their endorsement of Mr. Reynolds's proposition.

The President then declared the Institute closed.

LANSING INSTITUTE.

The Farmers' Institute at Lansing was held on Wednesday and Thursday, January 31st and February 1st. The attendance of farmers from the surrounding country was not as large as might have been. In this respect the Institute compares unfavorably with the others, while the addresses and discussions were excellent and exceedingly valuable to all who were in attendance.

The Institute was presided over by R. E. Trowbridge, of Bath, and W. A. Rowe, of Mason, was chosen Secretary. Messrs. Franklin Wells, of Constantine, M. J. Gard, of Cassopolis, H. G. Wells, of Kalamazoo, and A. S. Dyckman, of South Haven, members of the State Board, were present.

The exercises were opened with prayer by Rev. R. G. Baird, of the Agricultural College. Mr. Trowbridge then delivered the following

ADDRESS OF WELCOME.

I have been placed on the programme to deliver the address of welcome. We all have a right and an interest in welcoming each other. We have come together for consultation and to discuss the subjects in which we are interested, and from which we expect to derive mutual benefit.

Agriculture may be without assumption called the most necessary and most important pursuit in which men are engaged. Its fruits and profits include both food and clothing, so that it is not a matter of interest merely to those engaged in it, but the whole world is interested. On the success and prosperity of the agriculture of the country depend the prosperity of all other callings, so that the discussion of anything which has the effect to educate and advance that calling must advance the interests of all the people.

We are living in the last quarter of the 19th century, and in this century greater improvements have been made in all the arts and sciences than in all preceding centuries. We, who are advanced in years, in looking back on the methods of agriculture in our early days, see at once that it would be impossible

to drag down the existing system and put in its place the system practiced in the early history of this State. This is not only true of agriculture, but there has been rapid advancement in the methods of transacting all kinds of business, especially in travel and the conveyance of our products to markets, so it seems now as if the world would almost come to a standstill were we to go back to the old methods.

But in the matter of farm life, or the cultivation of the soil, improvement has been less than in almost any other direction. It certainly has been less, if we take the total number engaged in this pursuit. It is true that much has been accomplished by individual men, who have reached a very advanced position; but in investigation of the general principles which control the works of nature, the mass of agriculturists are merely picking up pebbles on the shore of the illimitable ocean of truth spread before them. Go into any neighborhood to-day, and you can readily see the great difference which attends the labors of the farmers. Almost always a few men are far in advance of their neighbors in methods of cultivation, and their crops are nearly double those of the ordinary yield of the neighborhood. Such incidents show a want of intelligence and investigation on the part of agriculturists as a class. In saying this I would not speak disparagingly of Michigan, for I can claim truthfully that her farmers, as a class, for intelligence and enterprise, stand higher than those of any other State in the Union.

Mr. Trowbridge dwelt upon the early settlement of the State, and contrasted the pioneers of Michigan with those of many other western States. In Michigan the early settlers came to make themselves homes, and they set to work clearing off the forests and breaking up the prairies with only that object in view. For this reason greater strides have been made in improvement and civilization than in States which were first settled by trappers, traders, speculators, and others, who only went to stay for a season. The very earliest step taken by our Michigan pioneers was to provide for the education of the children; and a system was so devised that, commencing with common schools, through graded schools, high schools, and colleges, we reach the University. These place us in the front rank, educationally.

These pioneers placed in the fundamental law of the State a provision that the Legislature should establish a separate independent college for the advancement of agriculture and the mechanic arts. In this regard we are the banner State of the Union, and none have offered so good facilities for the education of the children of farmers in farming pursuits. We feel proud of the Agricultural College, and that its graduates are invited to positions of honor in similar institutions of the country. But while we have a college for the education of our boys, there has as yet been no provision to educate farmers' girls. I want to see our girls have the same chances for education as our boys.

Mr. Trowbridge strongly advocated the establishment of a veterinary department at the College, for the reason that knowledge of this art would be a great financial saving to the farmers. He cited statistics to show the enormous loss in live stock, much of which could be averted with a proper understanding of the diseases of animals.

He spoke of the falling off in the yield of wheat on many of the farms in the State as an evil that should be arrested. Some of these farms which once produced 30 to 35 bushels to the acre, now produce only 10 to 12. It is to discuss such questions that these institutes are held, and the professors of the Agricultural College and members of the State Board of Agriculture are present to aid

in finding the best remedy for such evils. The farmers could gather much that is valuable from the experiments and teachings of the professors; while on the other hand he believed the professors would not go back empty-handed to the College after listening to the practical experiences of the farmers.

The chairman announced that Lieut. Gov. Sessions, of Ionia was unable to be present, but that he had prepared a paper which would now be read by Rev. L. B. Potter, subject

WHEAT CULTURE.

Wheat has long been an article of prime necessity in all civilized countries. It enters largely into the commerce of the world. For its transportation ships are built, canals and railroads are constructed, and large forces of men are employed in handling it. An immense amount of machinery is used in its manufacture into flour and feed for men and animals.

The soil and climate of Michigan are remarkably well adapted to the production of wheat: and where the methods and circumstances have become suitable, both the quality and the product have been satisfactory. To-day Michigan wheat holds a leading position in the markets of the world. No other single product of the soil has done so much for the comfort and independence of our people. In our early settlement it was the main, and at times almost the only reliance for food and supplies, and the payment of debts. For long years we had no surplus but wheat, and nothing else has done so much to aid in the improvement, progress, wealth, and prosperity of the State.

The important questions now are: 1st, Can we increase the product? 2d, Can we do it without exhausting the soil?

The statistics furnished by township supervisors in 1874 show that the product of wheat per acre in Michigan for the year 1873 was a trifle over 13½ bushels. Though these statistics are often inaccurate, and sometimes based on unreliable estimates, yet they contain the best information within our reach, and evidently are not far from the truth. Is there any farmer who is proud of or pleased with such an average? or who believes it to be a fair indication of the capacity of Michigan soils for the production of wheat? What man of them all would perform the labor and furnish the seed, knowing the return would be so small?

It requires the same amount of seed, and often equal and perhaps more labor is expended in raising poor crops; and yet the fact remains—no one disputes or questions it—that more than half the acres sown to wheat in Michigan produce less than thirteen bushels, while other and often contiguous acres produce two, three, or four times that amount. Labor so employed as to produce good results is both creditable and honorable; but to labor to no purpose is waste and folly, and the labor and seed wasted in vain efforts to produce wheat, when it ought not to be sown, and by methods that are unwise, is an immense item in the losses occasioned by misdirected effort.

Any farmer who has a good dry pasture or meadow which needs re-seeding to grass, is in a condition to produce a good crop of wheat. The land should be once plowed in June, and well plowed, in such a manner, if possible, as to let all surface water run off. The fallow should be kept clean, the surface made mellow, and sown with good clean seed, on or near Sept. 1. If the weather after sowing is wet and warm, and the wheat is making a rank and tender growth, it should be fed by cattle enough to check it and give it a sound, healthy condition, before winter is too near: as wheat may grow so rank and tender as to be unable

to endure the rigor of winter, while if in proper condition it will remain uninjured. By this method crops of 30, 40, and even 50 bushels to the acre have been secured. Numerous instances can be cited where the practice described has been followed for years with entire success; and failures, if any, have been occasioned by a surplus of water during the winter, while the ground was frozen, and when there were no channels for it to pass off.

Wheat sown after wheat, oats, or corn, may, and occasionally does, result favorably, but it is always uncertain, and if continued it never fails to bring waste and loss. There is every reason to believe that the product of Michigan wheat can be doubled, without any increase of the area sown, simply by adopting a more intelligent and careful system of cultivation.

We now come to the second question, "Can we increase the product and not exhaust the soil?" This point has been much discussed. Science and the laboratory have been appealed to, and yet nearly all we know in regard to it has been gained from experience and careful observation. We do not, cannot know the elements that compose a single rod of our soil. We do not and cannot know the changes that are constantly taking place in that soil, caused by agencies that we are ignorant of, and by methods that we cannot understand. But we do know that every load of wheat that goes from the farm contains some of its elements of fertility. We also know that lands in older States, which produced good crops of wheat 40 years ago, do not now yield wheat enough to pay for cultivation.

We have come to realize that no soil is inexhaustible; that the constant taking away, when no return is made, tends to poverty and barrenness. These considerations will be ever present to the mind of the wise and prudent farmer. He will regard his farm as his capital. He will remember that the tendency of nature is always to restore; that he has at all times within his reach the means to make his farm more valuable and more productive; that the man who as the result of cultivation makes his farm better year by year is the man most sure to produce good crops, while doing honor to himself and to mankind.

DISCUSSION.

J. J. Bush.—What is the propriety of only once plowing? It seems to me that twice plowing would be better.

J. N. Smith.—I believe our Michigan lands are capable of producing twice $13\frac{1}{2}$ bushels of wheat per acre. Do not think it would tax the land in proportion. When I raise a good crop my land is always better for the next crop. On lands not fully subdued twice plowing is a necessity, but after subduing the land thoroughly once plowing will answer.

Mr. Caruss.—I do not like summer-fallowing; think we cannot afford it. I plow my sod and plant to corn, manure this land the next spring and sow to barley, following this with wheat, and then seeding down. In this way the land is used every year. My barley and wheat crop together have brought me \$57 per acre.

W. A. Dryer.—I plow once and keep my fallow clean with a flock of good merino sheep. I would like to ask a question or two: first, how large must wheat be to be too large? second, will wheat joint until after it has had the action of frost upon it? I think it will not.

Mr. Caruss.—I have seen wheat that jointed in the fall. Mr. Wilcox, of St. Johns, once lost 17 acres by its jointing and winter-killing.

Unknown, from Watertown.—I bought a farm that had been poorly tilled and the first season only harvested 10 bushels of wheat per acre. The same ground broken up deeply and planted to corn, followed by barley and this by wheat gave me 20 bushels per acre. I broke up a sod plowing twice and harrowing well and harvested 25 bushels of wheat per acre, while a neighbor on a similar soil and sod, who plowed only once and then tilled with a cultivator, harvested only 15.

Mr. Thomas.—Have had considerable experience in wheat growing and upon sod I consider one good thorough plowing, followed by a frequent use of the cultivator and harrow, better than twice plowing. The loose, mellow surface soil accumulates plant food which is right where it gives the wheat plant a good start in the fall.

Mr. L. B. Potter.—I think we ought to compare our soils as well as our methods.

Prof. C. L. Ingersoll.—Profitable wheat culture depends largely on the seed bed. If the season or soil is such that the ground becomes compacted and hard a second plowing may be necessary to mellow it up.

Mr. More.—Are our soils so changeable that we can know nothing of their composition?

Dr. Kedzie.—Our soils are not fixed and changeless, neither are they very fickle. Plant food is constantly forming in the soil and is also being constantly washed out. The inert plant food in the soil is also constantly being changed to an available form. Chemistry will sometimes tell us the cause of barrenness in a soil, while in other cases it may be owing to physical causes and cannot be detected by analysis. The great trouble is to find two soils of the same composition, even when taken only short distances apart. Prof. Johnson says soil analysis is useless; this is one extreme; the other is to tell by analysis just what a soil needs to produce any given crop. The middle road is the best one.

Following the above discussion President T. C. Abbot gave an address on "Schools of Agriculture" (See lectures and addresses at the close of this record of institutes.)

THURSDAY FORENOON SESSION.

J. N. Smith, of Bath, read the following paper on

"GALLOWAY CATTLE."

Of one thing I feel quite certain, viz.: of being able to describe the Galloway so that he may be known or identified when met. He will be found hornless or polled, color black with slight tinge of brown or tan, long bodied, straight and broad on the back, deep broad shoulders, short legs with large feet, a thick shaggy coat of hair of remarkable length in the cold season, and a thick mellow hide under this rather harsh appearing exterior.

The origin of the Galloway is obscure, or rather runs back of any existing history of cattle. I quote the conclusions of the lamented Sanford Howard,

who in his history of "Galloway Cattle," published in the transactions of the Michigan Board of Agriculture for 1865, says: "The breed of cattle known as the Galloway may be said to be indigenous to a section of country known by that name in the southwest of Scotland. * * It is a breed of great antiquity, and on account of its various excellencies is sedulously preserved in its purity, and is not likely to be displaced by any other in its native district. Of its origin little can be said." In another place in the same history he says, "The Galloway breed belongs rather to the mountains than the plains, though the district which they occupy in Scotland may be said to be intermediate between the highlands and the warmer and more fertile lowlands. In hardiness and ability to stand rough weather and rough fare, they are excelled by no cattle except the West Highlanders." Their hides are thick, but mellow and elastic. Their hair is very thick, and much longer in winter than that of the English and most other breeds. Thus they carry a natural protection of which cattle belonging to a milder climate are destitute. They are seldom sheltered in Scotland, although the frequent cold storms of winter could scarcely be endured by cattle of ordinary constitutions."

Becoming satisfied on the points of hardihood and adaptability to rough and marshy pastures, and being located in what is on record as "a God-forsaken country," I about six years ago laid the foundation of my present herd; since which time have purchased nine, sold twelve, and have now on hand twenty head. After having this experience, I fully agree with the authorities quoted.

Their being hornless, thereby lessening the liability of injury to their fellows and other stock in the field or yard, adds materially to their value in my estimation.

My herd will stand at a rack, or stow under a shed as quietly as a proportionate number of sheep. In disposition I find them mild and tractable,—easy to learn any proper requirements.

As milkers I consider them equal to the average cattle of the country in quantity, but considerably above the average in quality.

As to their beef qualities, my experience having been confined to breeding stock almost exclusively, I can say but little from experience, but authorities uniformly agree that this is their strong point, both as to their early maturity and the quality of the beef. Cully in his "Observations on Live Stock," written in 1783, speaking of Galloways, says: "Few or no cattle sell as high in Smithfield (London) market, being such nice cutters up, and laying the fat on the most valuable parts, and this is a great excellence in all feeding cattle." In Mr. Howard's history, before referred to, I find on this subject the following: "The flesh of the Galloway is of very fine quality, and commands a higher price per pound in the markets of England and Scotland than that of any other breed, except the West Highlander and the cattle of the Shetland Islands."

My experience with grades brings me to about the following conclusions: What we commonly call one-half bloods carry fully seven-tenths of the characteristics of the pure bred Galloway sire; in fact, by the inexperienced hard to distinguish from the pure bred Galloway, furnishing a class of steers that at two and one-half years surpass the common cattle of the country of like age fully 25 per cent in weight, and as much more in ripeness on similar keep. Also for workers a superior ox to any thing I have ever tried, their remarkable development of muscle coming in play for heavy drafts, and their tractable disposition making a pleasant team to handle.

A gentleman in Colorado with whom I have had correspondence in regard to

Galloways, and the desirability of that cross with the Texan cattle, after adopting it wrote me: "I have one hundred yearling steers of this grade that are as uniform as a well bred flock of sheep, and show the Galloway characteristics almost as strongly as the pure bred, and please me very much, appearing to be well adapted to our country and style of grazing." My own opinion is that they are essentially a western, both north and south, pioneer cattle.

I am sometimes asked why, if a valuable class of cattle, are they not more generally known and adopted? I answer by saying they are the poor man's cattle, and have no powerful friends. Parties who buy stock, either cattle or horses, to gratify fancy, the greater the price they can get published to the world as having paid the more it tickles the fancy they are seeking to gratify.

If Lord Somebody, after purchasing the \$40,000 cow, had come to my farm I could have sold him one that, for the *practical purposes of life*, would have equaled the *famous* purchase, and discounted it the \$40,000 and given him a hundred to pay expenses home, quite an object these times.

Finally, and that the ladies may more fully understand, they, the Galloways, are not fully established as fashionable.

DISCUSSION.

M. Miles.—I admire Galloways. Each breed has its good qualities. If asked which was the best breed we could not answer without first knowing the climate, soil, culture, care, and nature of the questioner. These breeds cannot strictly be compared with each other. Each breed has its place and the merits of one do not detract from the merits of another. There are two classes of cattle, one for beef and the other for the dairy. The Galloways belong to the first class. They are raised on very poor lands in Scotland. The Ayrshires are bred for milk in an adjoining county. The Galloways give good meat, are hardy, and cut up exceedingly well in the coarse parts. They have not been as carefully bred as some breeds, but some are well bred and good. Angus cattle, a distinct breed, are sometimes exhibited at our fairs as Galloways. They come from the northeastern part of Scotland.

Rev. Mr. Collins.—Are the Galloways mild and quiet?

M. Miles.—They are mild, gentle and quiet when well treated, but will resent ill-treatment quickly. They cannot gore, but on a genuine fight will whip any other breed.

A. F. Wood.—I have kept many grade and some full-blood Galloways. They have been mild, eat coarse feed, and are hardy. I believe we have localities for the different breeds of cattle, and I believe Mr. Smith has the right breed for his place. Would breed them myself if I should abandon Short-horns.

M. Miles.—Fashion has a great influence, and at present Short-horns are very popular. If I was to raise stock to be sold as breeders this would have great influence.

L. B. Potter.—I object to Galloways, first, because they are not beautiful; and, second, because those who breed them think they can be neglected and do not take good care of them.

B. Baker.—Where cattle are allowed to run in the road the Galloways always look well while the others are poor. Some persons will not take good care of their stock anyhow. Is it not worth while to change and get that which will do well under poor treatment? Again, Galloways do not know the difference between grass and weeds; at least they eat both indiscriminately, and this is quite an object. The people of Michigan are not educated up to Galloways.

Their beef also is darker, and not so attractive in appearance as that of other cattle.

Wm. Ball.—The only aim brought forward in the discussion is money. We should have more than this. The Galloways are the careless man's cattle; we should have stock for which we will care and in which we will be interested. I am opposed to Galloways.

R. E. Trowbridge.—Two years ago I bought some steers to feed, and among them was a grade Galloway, picked up in the road, for which I paid \$25 the first of October and sold to Lansing butchers for \$75 six months afterwards. This steer was fed the same as the others, but did much better.

Rev. L. B. Potter, of Lansing, read the following paper on

HOW TO MAKE STOCK PAY.

This problem, though a hard one, is readily solved by these two rules:

Rule 1st.—Keep the best only.

Rule 2d.—Treat all you do keep intelligently and kindly.

But perhaps I ought to explain my position, and will try to do so as briefly as possible. When I say "*keep only the best*," you need not understand me to insist on your keeping the most fancy strains of the most fancy breeds,—not that. The moment one decides to keep or raise stock at all he should have a definite object in view, and should then decide upon and obtain the very best animal or animals for accomplishing that object. If beef be the ultimate object we must choose those animals that will yield the greatest weight of the best quality in the shortest time, the cost of feed being considered.

My friend Wood, I presume, will say the Short-horns are the only breed that can fill this requirement, while brother Smith would as confidently claim the same honor for the Galloways; others might name Herefords; and I have no doubt these are the three leading breeds in this climate,—perhaps in any climate,—and that they and their best grades may be made to pay well in beef. If the object be to produce butter, every man of observation or experience ought to know that some cows are expressly valuable for this purpose, and these only should be chosen. So there are cows specially adapted to the cheese dairy, and they only should be selected for that purpose.

If one thinks to engage in sheep husbandry, he must decide whether his location and surroundings are best adapted to the production of wool or meat as a specialty, or whether he can make more money by combining the two objects in one. I have no doubt the hardy, fine-wooled, pure Spanish, and their high American grades, when kept expressly for the production of fibre, are far superior to any long, or middle wools; while the great Cotswold or Leicester, if kept for *carcass*, where there are proper markets may give better returns than other breeds; yet if meat *and* wool as a double object be desired, the Southdowns are par excellence.

In horse breeding, any man would be deemed a fit candidate for Kalamazoo who should select a Clydesdale, a Connestoga, or even a Percheron to produce fast trotters, fleet racers, or even good roadsters; and I apprehend the man is just about as insane who attempts to breed the best farm and draft teams by combining ponies and thoroughbred runners or trotters.

I have thus suggested my general idea of rule 1st, and will only add, under that head, this: Not only should the best class of animals be chosen, but the best individuals from the best families should, as far as practicable, be constantly sought. Animals with serious defects must be sternly rejected, though they may trace an unbroken pedigree back to Noah's choice herd.

Among the most important things to be absolutely required in all breeding animals is a strong healthy constitution, and good antecedents "through many generations past." It is to my mind anything but a recommendation for any domestic brute, to say "He can live on nothing and keep fat." But as it is my motto, that

In killing, care, and feed
Consists two-thirds of every breed

let us now turn our attention to rule 2d: "*Treat all you do keep intelligently and kindly.*"

If my motto is correct, or nearly so, then there is too much importance attaching to the care or treatment of live stock to allow us to pass lightly over this branch of our subject. I have already suggested the matter of *killing* in connection with the *intelligent* treatment of domestic animals. Some poultry fancier has laid it down as a rule that "no one will become a good breeder who is not a good killer of fowls."

I have no doubt there is quite a portion of the stock kept by farmers through the country that is a burden upon their owners and actually running them in debt continually. If such be the fact, arising from the native inferiority of the *animals*, the sooner they are dispatched the better, even though their hides must be taken off and their carcasses go to the compost heap. The room they occupy and the food they consume could then be given to the remaining more worthy ones, who have too long been partially robbed by these dead-heads. But let me caution you not to go home and make a merciless slaughter until you have decided whether the blame all lies in the inherent inferiority of the animals, and no part of it attaches to their owners. Is it certain that you have done the fair thing by your flocks and herds? If you find you have not, then repent and reform and soon you'll be surprised at the rapid improvement in your *breeds*.

But some of you may say if raising and keeping stock on our farms can be made a *paying* business, please tell us exactly how it is to be done. I will try to answer specifically. Let us, for illustration, start with a single calf a day old. He is a good one, weighs say 75 pounds. I prefer to take him from his dam and teach him to drink; give him new milk for four weeks at least, all he will drink; then gradually mix with new milk that which has stood twelve hours and been skimmed, decreasing the former and increasing the latter, adding carefully and increasingly oil cake meal, shorts, barley, and oatmeal alternately as he will stand it, without scouring, until he will eat like a pig. Give him plenty of nice grass and pure water, and continue so to feed and treat him that he will make *some growth every day he lives*. When the autumn storms and wintry blasts come on, give your calf clean, dry, comfortable quarters, keeping up the supply of pure water, and as much good nourishing food as he will eat clean (don't give him a spoonful to leave or waste). If at any time you have over-fed, let him fast until the appetite is restored. Give a few roots often through the winter, and when he is a year old, just put him on the scales, and if he does not weigh from eight to ten hundred pounds, it will be pretty evident you started off with the wrong calf, and should do better next time. Your calf is now twelve months old, and if you choose to sell he will bring you as much money, and is worth more to the purchaser, than three pairs of little miserable orphans of the same age that have been obliged to shirk for themselves, take shelter in fence corners, and *shiver* all winter to keep themselves *warm*. But you keep the pet calf another year, following up your plan to make him grow every day, and weigh him now that he is two years old, and he kicks the beam at twelve or possibly fifteen hundred. Your blind, churlish neighbor, who ven-

tured to claim the six orphan runts (above referred to) during the summer, when they could "run in the road," or maybe trespass on you and others, perforce of hunger, has often groaned to your face and growled behind your back because you were (in his estimation) such a fool as to spend so much on *one* steer. The drover or butcher now visits your neighborhood, looks at your one calf, must have him at some price; you are not anxious to sell, because you know the calf will yet pay to keep. Your old-fashioned neighbor hears of the drover; he wants money terribly (and he always will), so he scours the commons and drives up his six little underlings, which but for their scrawny appearance and awful horns, might be mistaken for calves yet. The cattle buyer looks at them, is sick, don't want them at any price, won't have them any way, and leaves, followed by the alternate groans and imprecations of the poor man who is too short-sighted to see his own interest, and must now keep his starved calves one or two years longer before he can coax any sensible man to take them off his hands. No wonder he is disgusted with stock raising, and *knows* it won't pay. Let me here stop to say the *first year* generally decides the fate of all our stock.

Take another illustration: Two men start with each a cow every way alike; they pay say \$60 each for them; they are good ones. At the end of a year the two men compare results as follows:

A has his cow charged with ten per cent on cost.....	\$6 00
Ten per cent for sinking fund to replace cow in ten years.....	6 00
Pasture 22 weeks @ 30 cents.....	6 60
Corn fodder, straw, etc.....	6 00
1½ tons good hay @ \$8.....	10 00
1½ tons shorts or mill feed @ \$15.....	22 50
45 bushels mangolds or sugar beets @ 10 cents.....	4 50
Salt.....	40

Total.....	\$62 00
And credited with an average of 12 quarts good milk per day for 300 days equals 3,600 quarts, at 3 cents per quart,—total.....	\$108 00
Deducting Dr. from Cr. side gives net profit of.....	46 00

B has less items in his account, which stands as follows:

Ten per cent on cost.....	\$6 00
Ten per cent sinking fund.....	6 00
26 weeks pasture @ 30 cents.....	7 80
Two tons hay @ \$8.....	16 00
Rough feed, stalks, etc.....	1 20

Total.....	\$37 00
By 8 quarts milk per day for 270 days,—2,160 quarts, at 2½ cents per quart,—total.....	\$54 00
Deducting Dr. from Cr. side shows a net profit for the year of.....	17 00

(Both have had abundance of good water.)

Now, by analyzing these two accounts we see A's profits are \$29 more than B's, or 170 per cent greater,—no trifling difference. We notice that A's cow continued in milk 30 days longer than B's, and that she averaged 50 per cent more milk per day, and also that it was worth half a cent or 20 per cent more per quart. These differences in her favor are all accounted for *in the difference*

of keep. I expect some of you will doubt this assertion, but it must be remembered that a cow is a *machine* for the manufacture of certain staple articles of food for man, and that to *run* this machine requires a given amount of *power*, which can only be eliminated from the food consumed, and this power *must* be supplied to the extent that will keep the machine in motion *before* any amount whatever of manufacturing can be done. For illustration, it takes a given amount of fuel to produce enough heat to just start and keep in motion a steam engine and pump the water for its own supply, and up to this point it is only a dead loss to its owner. What shall he do? Would it be wise to sell his engine for what he can get and buy one having a better *pedigree*, and then treat that in the same way, or shall he add fuel to the full capacity of his first engine, though it may be only a "common blood" or "grade" machine, and go forward with his industry until he has made the first machine earn him money enough to purchase two or three of more approved patterns?

Too many of our live stock are kept just at a living point and then cursed by their owners and society because they do not contribute anything to the wealth of the country. They are condemned and abused because they are not the right *breed*, when the real truth is, the *poorest* breed *may* be so kept as to make better returns than can be obtained from the very best breeds kept at starvation points. Had I time, I could cite several cases in point, that have come under my observation, and many of you can recall cases that will confirm all I have said.

Though I have selected my illustrations from the bovines, if you are inclined to adopt my theory, I hope you will be able to apply it practically to all classes of stock, from the little gallinaceous biped that says "Good morning" to you at daybreak, to the equine beauty who prances proudly as though he were fully conscious that an intelligent feeder and humane keeper is holding the ribbons behind.

DISCUSSION.

Mr. W. A. Dryer.—I do not believe the calf should be fed oil-cake meal. We should raise our own flax seed and mix it with other grains and have it ground.

Mr. Trowbridge.—Mr. Dryer once told me he sowed flax seed on the places where his wheat winter killed, cutting all at the same time. The flax seed runs into the screen box.

Mr. Dryer.—When I have no bare spots in my wheat, I sow a small patch in my oat field, and then mix it with wheat screenings for grinding, using about one bushel of flax to ten of screenings. I have used flax seed for twenty years. Make a porridge of the mixture for calves. It will cause scours if fed raw.

Mr. Wilcox.—Calves should run with the cows until they are four months old, and then be well fed and cared for.

Mr. Batcheler.—With our ordinary manner of feeding we cannot compete with western or southern cattle. We must feed better so as to put our cattle on the market in a better condition, and at an earlier age than they do theirs. We may make a calf weigh one thousand pounds at twelve months old. To do this it will take of oats and corn ground together about one quart per day for the first three months, three quarts per day for the next three months, four quarts per day for the third three months, and eight quarts per day for the remainder of the year, or an average of four quarts per day for the year. This will require about twenty-two and one-half bushels of corn and twenty-two and one-half bushels of oats, and with corn at fifty cents per bushel and oats at forty this will cost \$20.25 cents for feed. At five cents per pound the calf is

worth \$50.00, leaving a profit of \$29.75. If kept until three years old this animal might be made to weigh two thousand pounds, which at six cents per pound would be worth \$120.00, at a cost of \$60.75 for feed, leaving a profit of \$59.25 for feeding the animal three years. Had we fed three calves during that time their sales with interest at ten per cent would have amounted to \$165.50, with a cost of only \$60.75 for feed, leaving a profit of \$104.75 on the three calves, or a difference of \$45.00 in favor of the calf sales. Many persons just barely let their animals subsist; this is about as profitable as trying to fill a shrunken barrel.

Mr. M. Miles.—In many cases stock feeding does not pay. There are several reasons for this: 1st, The animals are not full fed. Mastication and the animal functions require a certain amount of food to supply their waste. The more the animal will consume and digest in addition to this the larger the profit will be; 2d, Young feeding pays best. The true method is to select animals that mature early, and eat much and give large returns for the food consumed. Here is the great benefit of improved breeds. I believe that stock raising will pay better here than at the west. In stock feeding we must consider the value of the manure obtained.

Mr. A. F. Wood.—The earlier we can get the same price per pound for our cattle the better. Extra cattle always have and always will bring good returns. Beef well fed pays best, and the same is true of milch cows. I think the South-downs are the mutton sheep, and the long wools the combined class. The opinion that we cannot raise stock here as profitably as at the west is false.

Miss Miller of Marengo, Calhoun county, then read the following paper on

FARM LIFE.

Poets in glowing strains have sung, novelists, with all the beautiful and witching imagery of romance, have delighted to portray the beauties and delights of the "wood-embowered cot within the vale," until we would fain believe that in one of those rustic habitations we might pass a life-time devoid of care, drinking in only the sweets of a happy existence, leaving the bitter for the less favored class of humanity. "The Old Farm House" has been the subject of so many articles in our rural papers, where it has been so vividly described as standing in some quiet, shady spot overgrown with moss and ivy, the tasteful and comfortable appearance, without only an emblem of the love and contentment within, that I hesitated before venturing to attack the subject from another side, pointing out some of the acknowledged defects in the management of many of our country homes throughout the land. While I endeavor to do this please bear in mind the fact that having lived upon a farm since my earliest recollection my sympathies are enlisted in behalf of the farming community, and I shall speak only of those things which I think ought to be improved in their manner of living. As we travel through our country how many farmers' homes we find destitute of any or every thing ornamental, when a very little expense, combined with good taste, would render those homes inviting and even beautiful which are now so unattractive and devoid of pleasing mien. Farmers are apt to think that attractive houses and neat surroundings do not belong to their humble lot; that the city resident alone is supposed to possess the time and means to surround himself with such luxuries. This surely is a mistake, and if farmers would only take the matter into consideration a very pleasing effect would soon be the result. It is within the power of farmers and their wives to make farm life and farm homes so inviting that public opinion will change and

the name of farmer cease to be a reproach. Let farmers cultivate in their children a love for the pure and beautiful, then when they arrive at men's and women's estate they will be well fitted to journey through life as God intended. Instead of confining the girls exclusively to tiresome household drudgery, allow them a little time each day for recreation, giving them an opportunity to cultivate their taste for the fine arts; then, instead of growing sullen and dissatisfied, they will cheerfully take an active part in their assigned duties, feeling that life is not all a dull routine. Flowers there are of many kinds which cost nothing financially, and the little time required for their cultivation is just the exercise which that wife or daughter needs after a wearisome day's labor within doors, affording to many the only opportunity for enjoying the pure fresh air, the country's choicest production. Take good papers,—not just one for yourself,—but consult the taste of the other members of the family, and believe me your children will not be anxious to leave the scenes and associations of home for the uncertain pleasures of the world. Thus the days and years will pass while you spin and they weave the woof of character which is to clothe their individuality forever.

Farmers, I appeal to your pockets now! Loosen your purse-strings a little, and don't give Willie a colt which you think will die, telling him if he will take care of it it shall be his, and then (after a great deal of care and trouble on the boy's part) when you discover, much to your surprise, that it will make a fine horse forget your promise and entirely disregard Willie's claim, saying by actions if not words, "your colt, my horse." If your house is surrounded with trees and shrubbery, the fences in good repair, and every thing presents a neat, tidy appearance, how insensibly your own taste improves; how well you get along, perhaps not laying up much money, yet your expenses are all met, and you are much more influential in society. Do not stop and say, oh yes, these things are all well enough, but I am old, have but a short time to live. They will make your life pleasant, and your name will be long and gratefully cherished.

How many fail to appreciate country privileges—the bright sunshine, pure bracing air, green fields, grand forests, rocks and rivulets, changing from the brightness and bloom of summer to the innumerable charms of autumn. Very attractive this life, even to those who choose to term it verdant.

I have nothing particularly new to say in reference to our farmers' wives, yet the theme is certainly a worthy one. It is a fact that women of the present day, with all the modern inventions to lighten their labor, work harder than the women of fifty years ago. Take a ride with me into the country on a pleasant summer afternoon, and we will call at the residence of one of our best farmers and request him to show us his farm and barns. Notice the machinery which tends to make his work easy; notice also the number of men employed, giving him liberty to oversee and manage, he says; and let me whisper to you also the opportunity of driving to town, or any other place which he may choose, to converse with his gentlemen friends and keep his mind well informed upon the topics of the day. All that, you see, is well ordered and convenient, and you are highly pleased. Then enter the house; it is Monday, and three o'clock in the afternoon. There stands the pounding barrel and wash tub nearly filled with unwashed garments; the dinner table untouched since the family dined, and as we sit down in come a noisy group of children. The mother, who before looked sad, now looks mortified and discouraged. She attempts an apology, saying her three children (the oldest five and the youngest two years of age),

four hired men and husband take all her time, so this day, of all others the busiest, she is very late with her work. Poor woman! No wonder she looked sad and weary, and moved so languidly about. Allow me to say this is but one case out of a thousand similar. How many wives and mothers work like this all their lives (and they are generally brief ones), toiling without one week of rest, without any respite from work, no chance to read, no time to think about anything but her work; revolving from kitchen to pantry, from pantry to cellar, and back to the kitchen again, from thence to the dining apartment, and through the back door to the wood pile, traveling miles every day. With all this burden of responsibilities can we wonder that women, with the ills and cares of maternity, at last grow pale, fretful, and nervous? It is wrong, *all wrong*, this wearing out the body while the soul must go uncared for, unmurdered by reading and study, undisciplined by meditation, with hardly a moment to instruct the little ones whose minds are aspiring and grasping for food, and then perchance, when they most need a mother's tender love and counsel, she lies down too weary to rise again, and they are motherless. Ah, mothers, think of this, and remember that to your children the wide world cannot supply a mother's place; it can give no love so lasting and true as that of a faithful mother. If your husband says he cannot get along without three or four men, tell him you must at least have *one* servant to assist you. If he says it is too expensive, tell him so is it expensive to hire men, and with just one-third of what it costs to hire one man a month you can get a good girl to assist you that time. But men there are who think their wives never work hard. Oh, no; nothing to do but cook a little and wash a few dishes! I am glad that all men are not like this; I hope only a small number are; but when I look about and see so many wives and mothers who are but slaves to their husbands and children, I question the cause. It cannot be that God designed either man or woman to labor so incessantly as many do. Surely at the last He will require the talent committed to us with usury. And if in our haste to accumulate worldly goods we have neglected to feed and nourish the soul, what shall it profit us? One who spends his life battling with the elements is apt to lose his keen sense of the refinements of life, as well as of fatigue and exposure. His sensibilities are blunted, not only to pain, but to some of the subtler sources of pleasure. So, too, of the farmer to a certain extent. He goes through a hardening process, the results of which are excellent within a certain limit; if they go beyond that limit they are productive of harm.

Let us take an extreme case to illustrate the idea. Here is a farmer who was trained by his father in the manual duties of his vocation, and then kept at work like a mere machine. By the time he had reached his majority his habits were formed and he steadily pursued the same path without once inquiring for "a more excellent way." He gained money slowly but steadily, by working many hours of every day, and laying by as much as possible of what he earned. He indulged in nothing which cost money, and did not produce it, though it might yield a rich harvest of fine thoughts and delightful emotions. All such growth was nonsense. He preferred something profitable, as corn and potatoes. His wife baked, scrubbed, stitched and kept the household in order. If she set out a rose bush he dug it up and replaced it by a plant or shrub worth something, only tolerating sunflowers because they provided food for poultry. Her love of the beautiful in nature must receive satisfaction in beds of sage and summer savory, as they were useful plants. He considered it mere folly to spend any of his money in educating his sons and daughters, saying that "book

lamin" is well enough if a body has gumption enough to get it, but it won't fill the stomach, nor cover the back, nor make a man any "honester or contenteder," and for his part he will be pleased if his children know enough to take care of what they get and mind their own business, as he always tried to do. And he lived and died firm in this faith. But progress is the watchword of the day; not quite as often do we hear the remark that he does not know enough to be any thing but a farmer. The time is now past when a little knowledge of "readin, writin, and rithmetic" constitutes the catalogue necessary for a farmer's education. Perhaps a mistake more common than that of total indifference to training and education is that of thinking that the only way to be fair with all is to give each and every one the same opportunity, no more, no less, as if a family of children were like a row of round peas in a respectable pod, all alike in soul and substance. Again, we often find that the child's course is entirely prescribed before hand. The father informs us he is "going to make a lawyer of this boy," a doctor of that, and an architect of the third, while he has not decided for the fourth, unless he keep him on the farm. All right if he has examined the bearings and hit upon the right course, otherwise all foolishness, as it would be to say they should all be ministers, whether possessing the grace or no. If, instead of changing his plans and helping them to be what their gifts and inclinations favor, he still persists in "making or breaking" them after his own way, how soon is their energy crippled, their true individuality destroyed, their strength wasted and lost for want of expression. In this day of activity and thought men are educated to see the necessity of science and skill on the farm. No one can deny that there are many instances where "book learning" seems to do very little if any good for the possessor, or through him the world; but it is possible that the failure arises not from the education received, but from the ability not possessed in the first place. A man or woman who has little tact for the ordinary duties of life will not have less by having had opportunity for instruction and discipline; while those who succeed well without it could accomplish ten fold more with its assistance; especially would it thus aid the farmer, who has a field broad as the world, rich as the hidden wealth of mother nature. The magnetic powers of earth and sky, the chemical attractions and repulsions of soils, the germinal forces of plants and trees, the wondrous engineering,—putting all human skill to blush,—by which the Divine power sends the right atom from the insensate clod to the right place in each root, and trunk, and wheat-head or topmost twig of tallest oak; all these and much beside are in his wondrous realm. What scope for study, for thought, for work. What ample field for largest powers, for best culture, for boldest experiment, for most progressive, yet sagacious effort. Then how indispensable to success is careful training in books and work, theory and practice, the devotion of men of the highest culture and powers to this work.

But is this education now considered so necessary to be confined exclusively to the sterner sex? The answer comes faintly, but truly, no. The oft-repeated cry of woman's mental inferiority is fast being silenced; for the present age is constantly proving the fallacy of the theory. She has always been taught to consider showy accomplishments as more to be desired than profound knowledge of science and mathematics. She learns by intuition that as a general thing literary ladies are not attractive to the other sex, and she desires, of course, to please them, as is perfectly natural, so she only cultivates those branches that have a tendency to make her pleasing in the eyes of father, brother, or future husband. After she receives her diploma from some modern

seminary, she firmly believes that the further business of her life is to fall in love and get married. When this is accomplished, and the round of domestic duties entered upon, how is she to bend her energies to some new and unexplored field to keep pace with her husband. It is a fact that many of the American women are truly troubled Marthas. And how are they to "rise above those circumstances that would and do enslave them?" Alas! If one dare step out of the narrow track in which her foremothers have walked for generations, she is instantly dubbed as "strong-minded," which, spoken by masculine lips, means everything that is indelicate and unwomanly, and which, with its present significance, is a term of reproach. When mothers cease to teach their daughters that marriage is the chief end and aim of their existence; when society can receive a woman out of her teens without endeavoring to mortify her by applying the epithet "old maid," in a slurring manner, as though she were in some way disgraced by living an independent life, then will woman not only equal, but perhaps excel her brother in mental attainments. Teach her that she as well as he has a noble work to do in this life, then the close of her school days will find her fitted to commence some vocation in earnest, rather than to sit down and idly wait for the coming man. Examples of smart and talented women are not lacking to show us that woman can become both capable and intellectual if she chooses. Thousands of women to-day are abominable house-keepers who would have shone resplendent in other work. I would detract from the usefulness and honor of no employment, for nothing can be done without the help of a certain kind and degree of intelligence; but I do protest against the obstinate and intellectual waste of brain and talent that has so characterized the past,—a waste that inevitably results from misappli-ance. Thousands of farmers' daughters in school, in kitchen, in parlor, possess the power to serve and bless the world. How can they best do it? It is a question for parents, guardians, and especially themselves, to think about. The present and the future demand more than the past received. How shall the demand be met? Ever since the foot of man first pressed the green grass of earth, or the guiding star moved and stood still in the east, civilization and education have moved forward slowly but surely, hoping for a brighter future. The prayers of Godlike men and virtuous, heroic women have ascended to heaven, petitioning for better days,—days when all mankind might enjoy the rich reward of education, and stand free before their fellow men. "Something better!" "Something better!" is man's eternal cry. It needs scarce a prophet to foretell that great forces lie slumbering. New sciences, new metals, new worlds are yet to be discovered. Yon beautiful slopes shall teem with richer and nobler grains. The nineteenth century has done more to raise the farmer to his true position than any other since the world began. Decades are telling more wonderful stories now than centuries used to. Then brother, sister, friend, whether tiller of the soil, wife and equal, or humble servant to either of these, although far from the accomplished amelioration of your class, there is a light ahead, and by making your life something more than a vague questioning, a blind groping after something hidden will your most lofty aspirations be satisfied, and the life work for which you were created be nobly and truly accomplished.

Dr. R. C. Kedzie, of the Agricultural College, gave a lecture on "Electrical Conduction." See lectures and addresses at close of Institutes.

W. A. Dryer, an old pioneer of Lansing township, then read the following paper on

SHEEP HUSBANDRY.

This is one of the most important of the farmer's occupations. In comparing the profits of sheep husbandry with grain-raising, one very important factor is generally left out of the account, namely, that raising cereals impoverishes the soil, while sheep-raising enriches it. Without sheep the agriculture of England would be a failure. Their value to English agriculture is in their manure. Though not of themselves profitable, they make other branches of agriculture profitable. I leave this branch of my subject, of vast national importance, with the hope that it will be taken up and discussed by others; and will confine my remarks to my own observation and experience.

There are three general breeds of sheep in this country: 1, Long wools, of which there are two families, Leicesters and Cotswolds. 2, Middle wools, of which there are several families, namely, Southdowns, Shropshire downs, Hampshire downs, Lincoln, and perhaps some others. These are emphatically mutton sheep, producing comparatively a small amount of wool. 3, Fine wools, of which there are three families, namely, French, Spanish, and Silesian merinos. I can say very little of the first two named breeds from my own experience.

Prior to 1865 there were comparatively few sheep in the State excepting Merinos and their grades. At that time an excited demand arose for coarse and long-wooled sheep. Speculators introduced into almost every part of the State coarse-wooled sheep of every and all grades, mostly from Canada, and sold them for Leicesters, Cotswolds, Southdowns, or any other breed. It all depended on what the customer desired to purchase. They were crossed indiscriminately with the merinos. Five or six years of experience was enough, and in many instances they were disposed of as hurriedly as they had been purchased inconside- rately, and well-bred merinos have again been in active demand.

I have said there were three distinct families of merinos. We hear, it is true, of Infantados and Paulars, etc.; but I have never met with a practical sheepman who could practically explain the difference, except that the Paulars were polled sheep.

The French merinos are long in the leg, thin through the shoulders, flat-ribbed, a clumsy, coarse head, a profusion of heavy wrinkles or folds, wool yellow or golden, short, thick-set, uneven, and gummy; they are tender, requiring good care. The Spanish are much more compact in form, short, heavy legs, small, clean, fine heads, heavy neck, with moderate folds, fleece white, long, firmer and more even than the French. The Silesians are smooth in form, less compact, light, short legs, fine, neat heads, the fleece being whiter, finer, longer, and more even than either of the others. It has as good wool on the neck and thigh as on the body, and its wool brings the highest price of any in the market. They are less hardy than the Spanish, but more so than the French.

The above traits will show of which family the blood predominates in any specimen. There are now very few if any full bloods of either of the three families in this country, they having been bred together, and have produced what we now call the American improved merino. They are not excelled for weight and fleece in the known world, having carried off the first prizes at most of the international exhibitions. The high-bred American merino of today is small, compact, clean head, no wool below the eyes, pink-colored nose, large, clear, full, bright eye, tan-colored eyebrows and lids; short, thick, soft, velvety ears, heavy necks with moderate folds or wrinkles, broad, sound body,

fleece long, fine, thick set, clear, white, and even, extending over the whole body and down to the hoof; pink-colored skin on the body and scarlet red in the flanks; skin on the inside of the legs covered with soft, silky down. There is no hair on a pure bred merino sheep.

Mr. Dryer urged that rams without horns are better than those which have. Their progeny are less liable to have horns, and 100 wethers, all else being equal, would sell for from \$75 to \$100 more than the same number with horns. They are less pugnacious, and less liable to injure each other. Where the wool grows between the horns and gets wet, there is no chance for it to dry, especially where the horns grow close to the head. This is the case where the Silesian blood predominates. The odor attracts flies, and they deposit their eggs. In three or four days there are maggots, and in three or four days more your sheep is dead. You look at him, and think he got hurt butting. Pains should be taken to cut the wool from between the horns when shorn, and plaster thoroughly between neck and horns and around them with common tar. In a wet season it should be repeated two or three times.

Dealers, when fitting sheep for market, often put them through the housing and sweating process, which produces a uniform glossy, dark color. The whiter the oil on the wool the darker will be the surface, because the white oil is more limpid than the golden or gummy oil, and of course flows more readily and freely to the surface, where it dries on. Sweating the animal which is facilitated by blanketing, gives the fleece an unnatural fine, silky feeling. The process is exceedingly injurious to the constitution, vigor, and health of the animal.

In 1865 I bought ten ewes, for which I paid \$1,000. They were high, thoroughbred animals, in fine condition. I kept them in that condition through two breeding seasons. They bore but few lambs, and of comparatively little value. I then turned them out, giving them only common care. Two of them soon died. The balance in about one year recovered from their debility, lived to a good old age, and raised me many superior lambs. Their descendants form my present flock.

Mr. Dryer related an incident of a neighbor coming to him to buy a sheep. Mr. D. selected a fine animal which he offered for \$15. His neighbor wanted a better sheep. He was told that four weeks' housing would make the sheep just what he wanted. The man did not believe it. Mr. Dryer received a flock of sheep from the east and put the sheep above mentioned among them. The particular neighbor came, looked over the eastern flock, selected the \$15 sheep, paid \$40 therefor, and went his way, rejoicing to think that he had just the sheep he wanted. From 1862 to 1867 the demand for fitted sheep was so great that the ordinary method of housing and sweating was too slow, and dealers resorted to painting their sheep.

Judges at our fairs are not always educated in the business, and make many erroneous decisions. Superior animals are passed with little or no notice, and inferior ones often receive the prize. Sheep cannot produce good, strong, heavy fleeces of wool if infested with ticks. They are kept off with perfect success by feeding one-twentieth part of sulphur with their salt. I have not supported a single tick, to my knowledge, in several years.

Mr. Dryer gave some sensible suggestions in regard to feeding, shearing, and the care of lambs. From the middle of October to the middle of January, in our climate, about three-fourths of the wool is grown, for at this season of the year the sheep is putting on his winter clothing. The effort should be assisted

by good care and stimulating food. Thirty pounds of shelled corn fed to each sheep in the time above mentioned is equal to one and a half pounds of wool in value. Sheep that are allowed to lose flesh in this season are much more liable to disease, their wool becomes harsh, short, and light, affording but little protection to the animal from wind and cold, and much more food and care is required to carry it through to grass. As soon as such a sheep begins to thrive in the spring, if it lives to do so, the wool, being dead, starts from the skin, and is rotten and worthless except for shoddy.

Shearing, Mr. Dryer recommended be done early, for as soon as the weather gets warm there is no more growth. No sheep should be exposed to the long, cold storms of early spring. He also put in a protest against too close shearing.

The warmest discussion of the Institute took place over some of the ideas advanced in the paper on sheep husbandry. Wm. Ball, one of the most successful fine-wool growers in Livingston county, attacked Mr. Dryer on the housing process, and the debate between him and Mr. Dryer was earnest and sharp. Several others, among them Dr. Miles, A. F. Wood, of Mason, and Mr. Lyon, also gave their views on the subject.

Mr. C. A. Miller of Marengo next read a paper of which we have not the manuscript. The following condensed report of it is from the Lansing Republican of February 6th.

PEDIGREES IN SHEEP BREEDING.

Mr. Miller first condemned the general practice of the farmers in turning out their sheep to shirk for themselves, while their other stock is warmly housed and bountifully fed. The short-wools were his favorites, although the long-wools, like other breeds, have their place. He claimed the history of the merino sheep to run back anterior to the Christian era. They were first brought to this country from Spain in 1802 by Col. Humphreys, the American minister. He gave a history of the different varieties of short-wools, and believed the United States to be a natural home for them. The evidence that the merino sheep are the best for the largest number of farmers is that they are now far superior to the first importation, much larger, shearing double what they did when first imported. Not so with long-wools; they rapidly deteriorate.

He advocated the keeping of an American merino register, the same as is kept for shorthorns and other pure blood stock. He agreed with Mr. Dryer that by housing, shearing early, and pampering, grade merinos can be made to put on the external blood-like appearance which deceives committees at fairs; and the selling of such stock at enormous prices works great injury to sheep husbandry. If a register were kept, then grade breeders and fraudulent dealers could be exposed.

A discussion of the two preceding papers took place as follows:

DISCUSSION.

Mr. Ball.—I believe Mr. Dryer is at least original in some of his ideas: I have never seen or heard any thing like them. That the American merino sheep resulted from a cross of the French, Spanish, and Silesian is new. All New York and Vermont breeders claim that the American merino is the result of breeding in a direct line for a hundred years. That this is not the case is unfair to breeders who have spent their lives in improving our American merinos. That there can be no hair upon the American merino is another mistake. Hairs are an indication of purity. I believe that proper care and housing are essential

in bringing out the better qualities of wool. I think that the sample of wool shown by the essayist proves that housing tends to better the quality and appearance of the wool. Sheep houses should be well ventilated and well littered. In such houses the sheep will be benefited in health and constitution as much as a man would be to sleep in a well ventilated dwelling protected from the storm.

Unknown.—Is it desirable that sheep should have running water in summer? Some years ago I had a flock of sheep running upon a summer-fallow all summer without water and in the fall they were fat.

Unknown.—Is it desirable to commence feeding sulphur now to kill ticks on sheep?

Mr. Dryer.—Yes.

Mr. Caruss.—I sift dry sulphur into the wool to kill ticks, and it never fails. I began keeping sheep without housing, then followed an open shed,—shed with doors, and for the last three years I have used the basement of a barn, since which time the yield of wool has increased $1\frac{3}{4}$ pounds per head, and I can safely raise lambs in February.

Mr. Lyons.—Has the wool grown the length of the white wool exhibited since the sheep were taken into the barn, or has the housing drawn the color towards the surface?

Mr. Dryer.—What I object to is housing in warm weather. I keep my sheep out of cold storms in spring and fall, but do not shelter them from rain in warm weather when they do not need it. Summer housing and sweating is what has caused prejudice against the merino. Hair grows in the wool of our best sheep, but not on the legs.

Mr. Harrison.—What is the reason that wool on the wrinkles is coarser than elsewhere?

N. S. Anthony.—I do not believe that housing is the main thing that injures the sheep. I once bought a flock of sheep that had been fed high and under the same treatment as my other sheep they run down rapidly. I purchased another flock of a neighbor who housed but did not feed so highly, and these when treated as mine were did well. It is not housing, but high feeding that injures the sheep. We might as well stay out in the storms ourselves if it will make us healthier. The same rule holds good with sheep and man. Horsemen house and blanket their horses and are not condemned for it.

M. Miles.—Some of the differences of opinion arise because people are talking of different things. People talk of merino mutton as poor; this was true of the old Spanish sheep that had to travel 300 or 400 miles to their summer pastures and return in the fall. They had no fat. The present American merino, with better feed and less travel, makes very fair mutton. The fiber of the merino wool has also been changed. Youatt says the Southdown fiber is 1-500 of an inch in diameter; the merino 1-800 of an inch; and the Saxon 1-1000 of an inch. Present measurements make the American merino fiber only 1-1000 of an inch, and the Silesian 1-1300 of an inch.

Mr. Ross.—I do not believe that housing hurts sheep if they are only given plenty of ventilation. I kept some sheep in an open shed and afterwards in a sheep barn with these results: First year, with open sheds, 110 ewes gave me 122 good lambs; second year, with close sheep barn, 122 ewes gave me 36 poor lambs; third year, with well ventilated barn, 122 ewes gave me 111 good lambs. The feed during the three years was the same. Housing gives more and better wool.

AFTERNOON SESSION.

A paper was read by Prof. C. L. Ingersoll of the Agricultural College on the "Relation of Live Stock to the Farm" (see lectures and addresses following report of Institutes.)

Dr. M. Miles of Lansing gave an address, of which the following is an abstract from the Lansing Republican:

"THE FORM OF ANIMALS AS AN INDEX OF INTERNAL QUALITIES,"

and illustrated it with crayon sketches on canvas of shorthorns, Galloway, and Hereford cattle, to show the meat producing types, while the dairy cow was represented by a sketch of an Ayrshire. There was also a sketch of the native "Lyerey" breed to show defects in form. Of sheep he had sketches of the Southdown and Cotswold. The doctor claimed that the external form of animals serves as an index to the internal characteristics which give value. There are two methods of determining the quality of animals: one by the study of ancestry, and the other by the characteristics presented in the external form.

Comparative anatomists recognize the law known as that of the correlation of parts, or the balancing of organs. This is illustrated in the kangaroo, which shows great development of hind legs and a corresponding deficiency in fore-legs. Carnivorous animals have teeth for cutting and tearing, the crowns covered with enamel, with jaws so regulated as to give motion only in a vertical direction. These parts are in harmony with the digestive organs.

In herbivorous animals the same correlation of structure is noticed. They have teeth for grinding, and their jaws move laterally as well as vertically; their legs are used entirely for locomotion, and they have complex stomachs and digestive organs. The comparative anatomist is able from a single bone or tooth to tell not only the group to which an animal belonged, but its habits and the food necessary for its existence. Prof. Owen's discovery of the *dinornis* was alluded to. He had only a fragment of a leg bone about six inches long, but from this he calculated that it belonged to the ostrich tribe, but was larger and more sluggish. It had rudimentary wings, a large, powerful beak, legs used for scratching, and it fed on roots. Subsequent discoveries proved that the professor was correct in every particular.

The same principles control our domestic animals, and we should apply them for the purpose of getting a knowledge of their internal structure. Each breed has qualities of its own, but the meat-producing breeds should have characteristics in common with each other. These are a good constitution, good feeding qualities, early maturity, flesh of good quality, fine fiber and marbled, and there should be a large proportion of the choice parts of the meat and a corresponding diminution of those parts which are of low value. The form should be of good length, with a proportionate depth or thickness of carcass. If the body is excessively long without corresponding depth, with long legs and a coarse skeleton, the animal will be a slow feeder, slow of maturity, and often weak in constitution. An animal that is very short in body with a good depth and thickness of carcass will fat readily, with fat frequently laid on in masses, will mature early, but on the whole there would be a deficiency in weight.

One method of determining the relative proportion of the choice parts to the inferior is by drawing a line from the stifle to the point of the shoulder. The animal having the larger proportion above this line will be the most valuable,

as the best parts of the carcass are above this line. With this form the coarser or inferior parts would be of better quality than in animals of not as good proportion.

It is desirable that the bones of the animal be as small as is consistent with health and strength. The strength of a bone does not depend on its size. The best authorities say that animals imperfectly fed and nourished during growth have bones disproportionately large. Small bones are an indication of early maturity, while coarse, large bones and prominent joints indicate poor feeding qualities, late maturity, and coarse flesh, in connection with a large proportion of the cheap pieces in the carcass when slaughtered.

Various other points of animals were described. The head should be lean, light and not fleshy. The horns, hair, and hoofs have characteristics in common, and if they are fine indicate a better quality of flesh than if coarse. A good development of the chest was insisted upon. It had formerly been stated that animals fatten best with small lungs. This is not true. The lungs are important organs, and no animal can be a good feeder without a good pair of lungs. Deficiency of lungs is also an indication of deficiency in other parts. The shoulders should not be too upright, but should slope back so as to blend well with the crops and chine. If the shoulder is too upright there will be a coarseness of flesh, a deficiency back of the shoulder, and the upper line of the animal will not be as well developed. With a sloping shoulder we get a better quality of flesh and more symmetrical development of the fore-quarter of the animal.

The form back of the loin and hips was also discussed. The rumps should not be too near together. If so there will be a deficiency in flesh and fat between the rumps and hips. The thighs should be broad, straight, and nearly vertical. Where a curved outline is given to these parts we have invariably coarse meat, a deficiency in the loin, and but little space between the hip and the rump. That is, it will give great development to the coarser parts, with a serious diminution of the most valuable parts of the carcass. The flesh of such a formed animal is poor and tasteless, with no fat to be found, the kidneys often hanging by a mere string. Such a form is quite common among the native animals.

An abstract of this address does not do it justice, and we should be glad to have every stock-raiser in Michigan hear the truths it contains, in connection with the sketches of animals which the doctor used by way of illustration.

EVENING SESSION.

The following paper was presented by Mr. A. F. Wood, of Mason, on

SHORTHORNS.

To become a good breeder, as well as a mathematician, orator, musician, or painter, a person must have a natural talent for it, and precept and practice must go together. No one can learn all of any one science, even if he makes it a specialty. While the various departments of agriculture are slowly advancing, that of live stock is justly demanding attention. In the past, experience has

been a great teacher. In the future, we may be benefited by the past, and must combine theory with practice.

Any animal which will best accomplish that for which it was designed, with the same expense of keeping as another, is the most valuable. I believe a large portion of our State is better adapted to the growth and improvement of that class of cattle known as Shorthorns than of any other breed. I do not wish to be understood as thinking there are not localities better adapted to other breeds, but I shall confine my remarks to the central and southern parts of this State. Nowhere do blue grass and white clover grow more luxuriantly. Corn, millet, and Hungarian grass can be raised cheaply, and we have an abundance of timber for buildings to protect stock. From our location we can easily ship to other sections, and our climate is such that cattle shipped away will readily acclimate in other localities.

It is not every practical farmer who can make a successful breeder; but the more of them who breed successfully, the greater the demand and the better the market. It is often for lack of knowledge that people fail to improve their stock, believing the improved cattle are not worth the money asked for them. There never was a better illustration of this than the case of my own herd, grown in this county from 1868 to June, 1874, when they were sold at auction. Had they been left to purchasers of central Michigan, they would not have brought what they were worth for beef in a good market. But by there being two or three "posted" men from other States, the cows and heifers sold for about half price, as was proved by 14 of the 18 being resold in Illinois in one year for double the money. There were five bulls, which were needed to improve the stock of this section, but did not receive even a bid. One of them I have since sold for more than would have bought the five on that day. I have one left, which I do not believe I could replace for \$1,000, to use in my present herd.

Mr. Wood contrasted the prices in Michigan with those of Kentucky, where Shorthorns are extensively raised and appreciated; and remarked that one of the cows which at his sale, with a calf by her side, brought \$410, was sold the next year in Kentucky for \$1,175.

In discussing this difference in prices, as also the question as to whether any animals were worth the latter price, he referred to the prices obtained in England by improvers of this class of cattle in the 18th century, one animal being sold for upwards of \$5,000. Mr. Wastell, of England, who was considered an eminent judge of cattle, said that a long line of the best ancestors was indispensable, if men wished to breed to a certainty, always bearing in mind that great judgment is requisite in pairing the most proper males with suitable females. Thomas Bates, the originator of the Bates cattle, said in regard to breeding that "if their form be ever so good, without the grand requisites of good hair, handling and style, Shorthorns never are and never can be good animals. The value of pedigree depends not on its length, but on the length of time there has been a succession of the best blood, without any inferior blood intervening."

From the date of the first importation into this country in 1776 up to 1873, the breeding of Shorthorns in this country had been actively pursued by some of our most intelligent breeders, and the stock has been from time to time renewed by fresh importations from the most noted herds in Europe. Many of the best cattle of England had been imported, and it became evident to the English that the cattle in America were equal if not superior to theirs, and they came here

and made purchases, that they might maintain the high standard which their cattle had reached.

This created a demand here for such stock, greater than it otherwise would have been, and the prices were high. At the New York State fair in 1865 Ezra Cornell exhibited 3d Lord Oxford, which he sold to an English breeder. Mr. Thorn, an eminent breeder, remarked on this sale: "Mr. Cornell did well, for he bought him at six weeks old for \$1,000, had the use of him two years, and sold him for \$3,000; but he cannot replace him in this country or in England for the money, for I now have two orders for Dukes or Oxfords in my pocket that cannot be filled."

In 1873 a new era came in the prices of this class of cattle. At the New York Mills sale there was competition between England and America, as also between Englishmen, from \$10,000 to \$20,000 being bid for Dukes and Duchesses, and in three or four instances even more. This was not for the reason alone that the demand was greater than the supply, but because they were bred so strong in a line, in all the qualities combined, that they improved nearly all other Shorthorns when crossed on them. Still a Duke might not be worth more than \$300 to cross on "scrub" stock, when he might be worth \$3,000 to serve a class of Shorthorns. The same animal would be worth \$10,000 to breed to a class of very high bred Shorthorns, for it is admitted that without a Duke or an Oxford the high standard of the Duchesses cannot be maintained.

Our American Shorthorns may be divided into various classes. The common or not strong bred, with perhaps some crosses that are not good, sell from \$100 to \$200. The most practical cattle for improvement range from \$200 to \$1,000, depending on shape, quality, and pedigree, especially the top crosses. Another class includes Mazurkas, Peris, Wild-Eyes, and others, which frequently sell from \$1,000 to \$5,000 a piece. Some of the Princesses, Roses of Sharon, and Oxfords, have sold as high as \$5,000 to \$10,000, while the Duchesses are worth from \$10,000 upwards. Many bulls have been used almost exclusively to improve the common cattle of the country. Such animals, well bred, bring from \$100 to \$300 apiece, depending on how good they are, where they are used, and how the people are educated. The first named class of Shorthorns are better than native cattle, and if people can appreciate the difference, they will more readily accept a still better class.

No one in a country like this can afford to raise a "scrub" or common creature. He cannot afford to keep a cow that will not give more than 15 or 20 pounds of milk or make more than one-half or three-fourths of a pound of butter per day, when from an improved cow, which would require no extra expense of keeping, he could have nearly or quite double the amount of milk or butter.

I sold a Shorthorn grade to C. B. Eastman, of New York. She calved Dec. 24, 1872, and Jan. 1, 1873, he commenced to weigh her milk. For 180 consecutive days she gave 40 pounds of milk daily.

In regard to butchering qualities, Mr. Wood said he could not do better than give an extract from an address by Thomas Bates, as follows: "The improvement of the live stock would not require the employment of an additional hand, and if but one more pound of butchers' meat in ten could be obtained (and those conversant in the feeding will readily admit that more than double this increase might be expected), how much would be contributed to the advantage of the farming interest; and if the live stock were universally improved in this proportion, how great an addition would be made to the prosperity of the nation."

DISCUSSION.

M. Miles.—There is no other breed that approaches the Shorthorns in popularity, or in which so much money is invested. A pedigree is simply a means of tracing the qualities in the ancestors of an animal. The value of a pedigree depends: 1st, on its authenticity; 2d, on its completeness, *i. e.*, all the ancestors must trace back to pure bred stock; 3d, on the character of the ancestry. If the ancestors have been well and favorably known the animal is desirable. This was what caused the high prices at the New York Mills sale. If you know nothing about pedigrees, go to one skilled in them and trust to his judgment.

Dr. R. C. Kedzie read a lecture on "Green Manuring" (see lectures and addresses as above.)

After a vote of thanks to the State Board of Agriculture, and also to the professors of the Agricultural College, this Institute was declared adjourned.

[In closing this record of the Institutes, I desire to acknowledge my obligations to the newspapers published in the various localities where the Institutes were held, particularly to the Greenville Independent, the Jonesville Independent, the Owosso Press, and the Lansing Republican; also to Mr. W. A. Rowe, of Mason, for his excellent report of the discussions of the Lansing Institute.—R. G. BAIRD, *Sec.*]

LECTURES AND ADDRESSES GIVEN AT MORE THAN ONE INSTITUTE.

GREEN MANURING.

BY PROF. R. C. KEDZIE.

[Read at Traverse City and Lansing Institutes.]

By green manuring I mean plowing in green vegetable matter for the purpose of improving the physical condition of the soil, or for increasing the growth of subsequent crops by storing up in the soil plant food in available form. Green manuring is secured by plowing under fresh or green vegetable matter, whether grown upon that particular soil, or grown upon other lands and then removed to be plowed under in any given field. It is most usual to plow under the green crop grown upon the land to be manured, and thus the labor of cutting and hauling the manural crop is saved. Cases may arise where it will pay to cut and haul material upon land to be manured, for example, where a farmer has a swamp yielding only coarse grass, flags, and reeds, which will make excellent manure if plowed under in the green state, but are of little value when allowed to ripen and harden, on account of the slowness of their decay.

In this essay I shall confine my attention to the most usual kind of green manuring, *viz.*: where the crop is buried under the soil on which it grew.

Green manuring has been practiced from time immemorial. It was in high

repute among the ancient Romans, and is still practiced in Italy. Its benefits must be marked, or it would not thus be retained in use through long generations. Its beneficial influence has been equally felt in other countries of Europe. By its use the light sands of Belgium have been transformed into the most fertile soil of Europe. In that thrifty country not a weed or bush is allowed to go to waste; every green thing not used for food finds its way into the soil to enrich it. The wayside and hedges are gleaned for manure.

In this country green manuring is in large use; but I believe it is not as extensively practiced as it should be, mainly perhaps from certain theoretical views in regard to its nature and effects; and it is mainly to correct these theoretical notions, and to point out how it acts beneficially, that I bring the subject to your attention. When we see clearly how and why anything acts beneficially, we are in better condition to secure that benefit. Besides this, there is a certain satisfaction in understanding the forces with which we have to deal. When the brain is busy the hands are less weary.

One reason why farmers undervalue green manuring is that "it adds nothing to the soil but what it took from the soil;" to take away a certain material and return the same will not increase the sum total. I might reply to this, how can you explain the influence of a clover sod in increasing the yield of wheat? If the clover adds nothing to the soil, why does wheat grow so much better on such sod? In assuming that the manural crop adds nothing to the soil, we forget the large amount of food material which the plant has accumulated from the air. The atmosphere is an inexhaustible storehouse of the combustible elements of plant structure, and the air over any field is not a stationary mass, but is changed by the winds every hour. The great bulk of vegetable material is drawn directly from the air. The mineral elements come only from the soil, but for the combustible elements the plant finds an exhaustless storehouse in the atmosphere. We thus find that the plant does give back to the soil more than it took from it; it is an accumulator of atmospheric plant food. But if the air is such a storehouse of plant food, why use any crop to accumulate this plant food in the soil for the use of a succeeding crop? Is not the atmosphere an available storehouse for all kinds of plants? True; but different families of plants differ greatly in their power of taking up this plant food from the air. This is seen most distinctly in the different capacities of different families of plants to accumulate nitrogen from the air. When I speak of combined nitrogen don't say, "that is scientific trash that does not concern me; I don't want combined nitrogen; what I want is wheat!" I once heard a witty farmer reply to a professor who was talking learnedly about the nitrogen in crops, "Doctor, if you will tell me how to raise twenty-six bushels of wheat to the acre, and do it every time, I don't care whether there is an atom of nitrogen in it!" But you cannot have the wheat without nitrogen. The very materials which elevate wheat above every other kind of vegetable food cannot exist without nitrogen. We can "make brick without straw," but the wheat plant cannot form the berry without nitrogen. The masterly researches of Lawes and Gilbert have demonstrated the great importance of an adequate supply of combined nitrogen for the production of wheat. It is the imperative demand of high farming in the production of cereal grains.

While all plants are capable of drawing a certain amount of required nitrogen from the air, they differ greatly in this respect; one class, characterized by broad leaves and abundant foliage, are capable of drawing almost the whole of their nitrogen from the air and leaving a surplus in their remains for the wants

of succeeding crops; while another class, which have narrow leaves and a small amount of foliage, are incapable of obtaining a sufficient supply of nitrogen from the air for full development. This distinction is forcibly expressed by Ville of France, who divides plants into *nitrogen producers* and *nitrogen consumers*. Red clover may be taken as the type of the nitrogen producers and wheat of the nitrogen consumers; the one is broad-leaved, has abundance of foliage, and can arrive at a high degree of development without the use of nitrogenous manures; the other is strap-leaved, has little foliage, and cannot reach a satisfactory development without a supply of nitrogen beyond what the air can afford; it demands an accumulated supply of nitrogen in the soil. The pressing demand of all cereal crops is an adequate supply of available nitrogen in the soil. This may be furnished by barnyard manure, by nitrates, salts of ammonia, guano, etc., or it may be furnished by growing crops which have a special power of accumulating nitrogen from the air, burying these in whole or in part in the soil and thus storing up in the soil an amount of available nitrogen for the use of future crops. The power of one crop thus to store up materials for the growth of future crops is a fact that lies at the foundation of successful agriculture. The plaster which is so abundant in our State has a marvelous power of promoting the growth of clover, and the clover is the best possible preparative crop for wheat, which is the *cash crop* of our State. Plaster and clover become *plenty* and *cash* in the hands of a good farmer on a kindly soil. George Geddes told me that he had a field which had been constantly cropped for 40 years which had not in that time received a single load of manure, but that its fertility had been kept up by plaster and clover; that the field was then in as good heart as neighboring fields which had received liberal dressings of barnyard manure.

But the beneficial influence of green manuring is not confined to the accumulating of combined nitrogen. Fresh vegetable matter, from the large amount of water which it contains, undergoes rapid decomposition when buried in the soil; in this respect it is much superior to dry vegetable matter, such as straw. This rapid decomposition imparts a tendency to decompose to other materials in the soil. Inert humus in the soil is converted into more active form; it even acts upon the inert mineral matter in the soil, converting it into the soluble and active form, thus securing an increased amount of mineral matter to sustain plant growth. By green manuring we thus secure an increased amount both of organic plant food and of inorganic or mineral plant food. If it does not directly add any thing of mineral matter to the soil, it does what is equally as important, viz.: it converts inactive and useless mineral matter into a form available for the use of growing plants. It may be called the masticator of the soil.

The roots of growing plants also exert a corroding and decomposing influence upon the inert materials of the soil. Sachs demonstrated this fact by taking polished plates of marble, dolomite, phosphate of lime, gypsum and glass, placing these in quartz sand which was kept moist. In this sand seeds of peas, Indian corn, squash, and wheat were planted and suffered to grow. The roots penetrated the sand and coming in contact with the plates below branched out horizontally on their surface. After a time the plates were removed and examined, when the plates of carbonate of lime and magnesia and the phosphate of lime were plainly corroded where they had been in contact with the roots, so that the course of the roots could be traced without difficulty, and even the action of the root hairs was manifest as a faint roughening on each side of the

path of the root. Dietrich made a similar investigation by powdering some sandstone and basalt, washing away all soluble matter by distilled water and placing in weighed quantities of the pulverized material, seeds of various kinds and allowing these to grow for a time. All dust was excluded by a covering of cotton batting. At the close of the experiment the soil was washed with water containing one per cent of nitric acid. It was found that the plants employed, especially lupins, peas, vetches, spurry, and buckwheat, assisted in decomposing and rendering soluble these soils. Not only did the plants take up mineral matter from these powdered rocks, but the soil contained in addition a larger amount of soluble matters than was found in experiments where no plants were made to grow. The cereal grains had the same effect, *but in less degree*. Thus a pea plant made from 10 to 40 times as much material soluble as did a wheat plant in the same conditions.*

Thus the roots of plants assist in *masticating* the soil, rendering its materials soluble even beyond the wants of that plant; but this power is most strongly manifested by the leguminous plants, and only feebly by the cereals. So far as the immediate effect is concerned, the material thus made soluble, which would otherwise remain inert, is as good as so much added directly to the soil; so that practically green manuring adds mineral matter to the soil as well as organic matter, and thus restores more to the soil than it took from it, so far as present productiveness is concerned. This shows the fallacy of the objection so often urged against the practice of green manuring.

One advantage secured by green manuring over the usual process of feeding to stock and using the excrement as manure, is that we thereby secure a greater amount of carbonaceous material in the soil. In feeding, a large amount of the carbon is oxidized in the animal, and escapes as carbonic acid in the breath. In green manuring, the whole of the plant material is saved in the soil, and we thus rapidly accumulate humus in the soil. By the vegetable matter thus secured in the soil the physical properties of the soil may be greatly improved; the heavy clays are made more open and friable, and light sands are made more compact and tenacious, more retentive both of moisture and manural matter, and thus any tendency to leaching is mitigated. If you will consider for a moment the influence of laying down to grass for a few years a heavy clay, and the condition of culture secured by breaking up the green sward, you will find proof of my first assertion. The clay is much easier to cultivate while the influence of the sward remains. When sandy lands become too open and light by frequent plowings, the farmer "lays it down to grass to compact the soil," but this compacting is essentially an accumulating of vegetable matter by the green sward. Do not suppose me to hold that green manuring is the only kind of manuring to be recommended and practiced; I only want to call your attention to certain advantages of this process, without entering into discussion in regard to other kinds.

A farm differs from almost every other kind of property in its capacity for perpetual production. A horse or a cow lives but a few years, and the problem for the farmer is how to produce the greatest profit from them for the short period of their life. But a farm never dies,—or never should die. It is a possession for all time, and should be farmed with reference to its perpetual productiveness. The man who for immediate profit "skins his farm" by injudicious cropping is as short-sighted as if he should skin his living cow for the profit in the hide.

*How crops feed, pp. 326-7.

Some one has wisely said, "in building a house, build as if you expected to live forever." The same rule is emphatically applicable to farming. *Manage your farm as if you expected to live forever.* Whatever treatment will injure your farm in future time, avoid in the present time. The house, though hewn out of granite, will fall at last, but the farm may be so conducted that for thousands of years it may exhibit ever-increasing productiveness. Manage your farm so that your fields shall keep green your memory long after you have turned to dust. To this end, the fore-sighted farmer will carefully guard his fields from certain enemies of good farming in the shape of noxious weeds that are valueless in themselves, capable of indefinite reproduction, and difficult to exterminate. He that will love life, and see good days, he that would have his sons rise up after him and call him blessed, let him keep his land free from quack-grass, the daisy, and Canada thistles. If they have gained a foot-hold, proclaim war to the knife, and the knife to the hilt! They are a trinity of cursing. Let the poet sing of the beauty of "the bright-eyed daisy," but let it remain poetry; do not translate it into the sturdy prose of farming. If you want any of these pests to look at, to study their habits, plant them in a flower-pot, place this in a cast-iron kettle, enclose this in a brick arch, and then stand sentinel over them as long as they live, that not a seed or creeping root ever finds its way to your farm to spread mourning, lamentation, and woe over your fair fields. Many a farmer by his negligence is leaving a heritage of evil that shall curse generations yet unborn.

When these pests are present, a naked fallow with repeated plowings seems a necessity to clean the land; and any fallowing which will do this is wisely employed. But when these are absent, the land may be effectually cleaned by a fallow crop, for example of buckwheat. I consider this the best cleaning crop, because it covers the ground with foliage in a very few days, and nothing will grow under its shade. A crop sowed the last of June and plowed under in September will vanquish June grass as effectually as any naked fallow. It is the best remedy I know for pigeon grass, red root, pig weed, etc., except the cultivator and the hoe used often and thoroughly. A very intelligent farmer once said to me, "The best cleaning crop I know is to plant my field to corn and *keep it clean all the season.*" But when a man is cursed with an ambition to have a large farm, he may not be able to command the amount of labor necessary to secure this effectual cleaning by constant working, and a cleaning crop becomes a necessity.

The farmer often asks himself, "shall I make this field a naked fallow or raise a manural crop?" Before we answer this question let us define a naked fallow. In the strictest sense a naked fallow would be where the land is plowed up and left for a season without any crop simply to secure chemical changes in the mineral matters in the soil. The farmer often speaks of giving his field a rest; but the soil is never weary. Man becomes tired by toil, and his team is fresher and more vigorous for a rest, but it is only animal nature that tires and needs rest. The forces of inanimate nature are clothed with perpetual youth; gravitation never relaxes his hold because he is tired; the sunshine never asks for a holiday, and the river runs joyously to the sea, age after age. If the soil is more productive after a season of rest it is not because the soil was tired, but because certain chemical changes in the soil during the fallow period have converted some of the inert materials of the soil into the active form. If these chemical changes have been secured by the action of dead matter in the soil and not by the decomposition of fresh vegetable matter buried in the soil, then

we have a naked fallow. But plowing up a stubble field and letting it lie idle for a season is not strictly a naked fallow, because a large amount of vegetable matter is buried by the plow. Still less is it turning under a greensward, because of the large amount of undecomposed vegetable matter plowed under. In order to obtain some definite idea of how much fresh vegetable matter is contained in an acre of greensward, I dug up four specimens of sod, two of heavy sod which had not been pastured, and two of light sod that had been gnawed to the dirt. I very carefully washed out all the soil I could; there was a little soil left, but this was fully balanced by the vegetable matter removed by washing. After the water had drained off and evaporated, but while the vegetable matter was in the fresh state, I carefully weighed the sods and estimated the amount of fresh vegetable matter to the acre. The heavy sods averaged 37 tons of fresh vegetable matter to the acre, and the light sods 19 $\frac{3}{4}$ tons. When thoroughly air-dried the heavy sods averaged 19 $\frac{3}{4}$ tons to the acre, and the light sods 9 $\frac{1}{2}$. I have found specimens of green sward where the amount of vegetable matter was greatly in excess of these amounts. These sods were June grass, and probably contain less vegetable matter than fair specimens of timothy and clover sods. I think we would be safe in estimating in a green sward the amount of fresh vegetable matter at 25 tons to the acre,—fully equal to 25 loads of fresh barnyard manure. This shows the unfairness of calling a greensward plowed under, a naked fallow; it is any thing but naked, even if the blanket is not outside.

In breaking up a green-sward of timothy or clover for a summer fallow the farmer has little difficulty in subduing the grass; but the case is quite different with a June grass sod, unless the sod is buried deep and the furrows laid flat and even; and the June grass soon springs up in a vigorous growth, the sod does not rot satisfactorily and the fallow is in poor condition for wheat in September. Some farmers try to kill the grass by keeping a flock of sheep on the fallow, but with indifferent success. The English in speaking of grass lands complain that "the gnawing tooth of the sheep is more than a match for the golden foot." But I never knew sheep to gnaw a June grass sod to death. The fact is, June grass is the carpet-bagger of our meadows; it will drive out every other grass except its twin brother,—quack. Turn a June grass sod upside down and it is still ready to grow; "it has two strings to its bow." With some diffidence I would recommend a smothering process for exterminating a June grass sod by using a green manuring crop. When the fallow is broken in June sow some rapidly growing crop, such as rye; the ground is soon covered with a growing crop before the June grass can "right about face," and is smothered as a consequence. In August when the pastures are in poor condition you will have abundance of succulent food for your cows, which may be pastured on your fallow. When you plow your fallow for wheat in September your sod is well rotted, and you have also secured the benefit of an additional green manuring for your wheat. There may be objections and difficulties in this plan which I do not comprehend, but I would like to see it tried.

This brings me to another phase of green manuring which I have long urged before my classes in agricultural chemistry. Suppose you have a stubble field which you design to plant to corn next year. If the stubble is left undisturbed a crop of weeds will spring up and ripen their seeds, which will keep your hoe and cultivator busy the next season. Instead of this course, plow up your stubble in August and sow it to winter rye. This may afford some fall feed, and if the snow is not too deep, your sheep will get half their winter living from

the rye, and be in better health for the green food. In the spring your cows will receive large benefit from this early pasturage, and when you plow your field for corn you will give this all the benefit of a manural crop, while your land will be clean of weeds. This plan may not succeed on stiff clay soils because of the poaching by the feet of the cattle when the ground is soft; but on well-drained and sandy soils I think it is worth trying.

There are certain exceptional conditions where the naked fallow, and the nakedest kind of fallow, is the farmer's only reliance, viz.: In exterminating certain insect pests, such as the wire-worm. If your fields are infested with the wire worm, you will find he is a wiry customer to deal with. The birds will do little for you, for they cannot dig down to the worms, but only forage on the surface, where the worm is seldom found. You may "drench your fields with sulphuric acid in sufficient amount to destroy the worms, and then dress your land with lime to neutralize the acid and thus form sulphate of lime or plaster, and enrich your fields thereby," but you will find the expense enormous. You may bait the worm by placing slices of potato in the ground and picking off by hand the worms that gather on the potato, but to clean a large field of wire-worms by this process you will find to be about as hopeless as dipping Grand River dry with a teaspoon.

The wire-worm is in an impregnable fortress, and your only way to make him surrender is to *starve out the garrison*. You can only do this by absolutely cutting off all food supplies for one season. Leave not a blade of grass or a weed of any kind. The worm prefers the roots of the juicy wheat or the succulent corn, but when brought down to famine diet he will keep healthy and lively on weeds of almost any kind. You can speedily and effectually exterminate the wretch only by absolute starvation. For this purpose let your fallow for one season be absolutely naked; stir the ground often to promote the speedy decay of any vegetable matter in the soil so as to cut off all food supply at as early date as possible, and at the end of the year you may shout victory! You will lose one crop by the process, but is not this better than year after year to share your crops with this remorseless robber?

Another marked benefit secured by green manuring arises from the different habits of plants in regard to the distribution of their roots in the soil. One class send the most of their roots deep into the soil, and draw most of their mineral or ash food from the subsoil; the roots of another class are mainly distributed in the surface soil, and draw their ash food mainly from this source. This is especially true if the soil is clay, or if there is a hardpan beneath the surface soil. I call the first class the *deep-feeders*; the second class, the *surface-feeders*. Clover and other leguminous plants are deep-feeders; wheat and other cereals are surface feeders. Last year I sent my class in agricultural chemistry to test my statement in regard to the depth to which the clover sends its roots. In a very tenacious clay soil they traced the tap root of a clover five feet and some inches into the soil, when the root broke and they lost the trail. The tap root of the clover knows what it was made for—to tap the subsoil, and draw off its mineral wealth. If you will examine the root of a pea, instead of a tap root you will find three or four roots, nearly parallel, passing very deeply into the soil.

Leguminous plants, but especially the clover—the king of manural crops—draw their main supply of soil-food from the deep subsoil, and by their growth and decay they accumulate these salts in the surface soil. I call them the *soil pumps* to pump the resources of the subsoil up to the surface soil, where it is

stored for the use of surface-feeders like the cereals. When the clover is buried in the surface soil it has added to this soil mineral matter which was not there before; it affords a positive increase to the surface soil not only of nitrogen and other accumulated air food, but also of potash, lime, magnesia and phosphates for the use of subsequent crops. This wonderful power of clover to drink in from the air above, and to pump up from the deeper soil beneath, all the elements so essential to the development of cereals, and which they unaided are so powerless to secure, explains why clover is such an excellent preparative for a wheat crop. Much of this benefit is secured by what the scythe leaves, viz.: the clover stubble and roots; but when the whole crop is buried in the soil, the effect is astonishing.

Over the climate of his farm man has no direct control; the seasons, whether wet or dry, warm or cold, are beyond his reach. Indirectly he may modify the climate of his fields by drainage, by the amount of vegetable matter in his soil, by shielding them by wind-breaks, or by opening them up to the action of the wind and the sun. But over the soil and its food supply for vegetable growth, he has unlimited control; he may make it as productive or unproductive as he will. But in all these operations the question of cost and profit must be always kept in view. The production of large crops by a wasteful expenditure of capital is not a result over which a farmer need feel proud. The man who buys superphosphates, while his land is cumbered with bones, who buys potash, and sells his ashes for six to ten cents a bushel to the soap boiler, or who buys guano, yet leaves his dead animals to pollute the air of the neighborhood by their decomposition, is not a model farmer. The question that should always be before the farmer is, how can I most economically make my fields the most productive? I have tried to answer this question in part. I have not kept in view exceptional conditions of soil cultivation, such as market gardens where from high price and ready sale of perishable products, the gardener is justified in paying a high price for commercial fertilizers, but I have confined my attention to farming as it is usually carried on in this State, where the chief products sold from the farm are wheat, wool, pork, beef, butter and cheese. These are commodities that will bear transportation, and are always marketable in any part of our State. I do not give my attention to the person who is eager to sell all his low-priced grains, hay, straw, stalks, and every coarse material that can be sold for any price, however low, because I doubt if such a man should be called a farmer. A hundred dollars' worth of wheat or wool removes a certain amount of productive material from the farm, but it becomes a vanishing quantity compared with the productive material removed in a hundred dollars' worth of straw. Every pound sold off the farm is so much available capital removed, and the wise farmer will consider how much he is diminishing his available farm capital by what he sells, and see to it that the capital thus withdrawn shall bring the largest pecuniary return. Some may object that if my advice were followed, the coarse farm products would never be found in market. But in farming as in social life, it will ever remain true "the poor have ye always with you."

I look with sincere pity upon many farmers who are settling down into discouragement over the condition of their farm; their crops are light for want of manure, the dunghheap is small from want of crops; from want of anything to sell they are too poor to buy fertilizers, and in utter hopelessness they exclaim, "farming is poor business." Well, such farming *is* poor business. I do not speak of this to add to his discouragement, but to give him a word of cheer, to point him if I can, to some way to better his lot. I believe the cheapest and easi-

est way to bring up a run-down farm—one that any and every man can use—is by green manuring. Suppose your farm is too poor for clover, and grass makes only a feeble growth: put on it a manural crop that will grow, such as rye, turn this under with your plough, and you can then raise something better; keep feeding your soil with everything your shovel and your team can command—ashes, leached ashes, if you can get them by drawing them within five miles, muck, marl, anything that will bring a green mantle over your fields. Soon you can set the clover-pump to work pumping up to the surface the inexhaustible resources of your subsoil. If an animal dies, don't stop to bewail your luck and exclaim, "ev'rything goes to the dogs on my farm!" Don't send it to the dogs at all, but compost it with muck or even soil, and thus secure a most valuable manure. Samson performed a wonder by taking honey from the dead carcass of a lion; outdo that wonder by extracting wheat from the carcass of your dead cow. Pick up all the bones you can find, put them under cover and mix with them two or three times their bulk of ashes from your kitchen; moisten them with enough water so that the potash may act on the gelatin of the bones, stir them over once a week, and in a month or two you will find the bones so tender that you can cut and crush them with a blow of your shovel; beat the whole into a powdery mass, and you will have a manure better than the average of the superphosphates which you feel too poor to buy. Give a hand full of this to each hill of corn and see how it will wave its banner of green, and pour into your basket the golden ears of corn!

But in bringing your soil into good condition, do not neglect green manuring; let every wind that blows over your fields bring them a blessing in the shape of atmospheric plant food. Do all these things patiently and hopefully, without urging your soil beyond what it can do, and you will yet out of the fullness of a grateful heart exclaim, "bless God for the farm!"

ELECTRICAL CONDUCTION.

BY R. C. KEDZIE.

In the Farmers' Institutes of last winter I spoke of lightning-rods, their forms and construction, and endeavored to tell farmers how they could put up their own rods with a very large saving of expense. I stated that the highly artificial forms so generally in use, such as fluted rods, wire ropes, flat strips, etc., were not essential features of a good rod, and that increase of surface gave no increase of conducting power. On this last statement a warm discussion arose, and Prof. Henry, Secretary of the Smithsonian Institution, was quoted as authority for the doctrine of conduction of electricity of high tension at the surface. Out of this came the correspondence and investigation which I now present to you, beginning with the letters of Prof. Henry, which he has kindly permitted me to use.

Prof. Henry's letters, with his final corrections, are as follows:

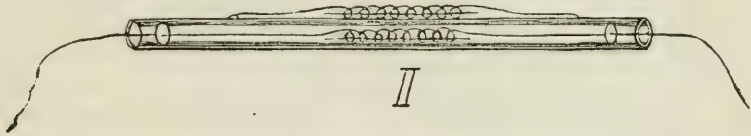
SMITHSONIAN INSTITUTION, }
 Washington, March 11, 1876. }

DEAR SIR:—In answer to your letter of 7th inst. I have to say that the discrepancy which exists as to the question whether electricity passes at the surface

or through the whole capacity of the rod has arisen principally from experiments on galvanic electricity, which having little or no repulsive energy passes through the whole substance of the rod, and also from experiments in which a very large quantity of frictional electricity is transmitted through a small wire; in this case the metal is resolved into its elements and reduced to an impalpable powder.

In the case, however, of the transmission of atmospheric electricity through a rod of sufficient size to transmit the discharge freely, there can be no doubt that it tends to pass at the surface, the thickness of the stratum of electricity varying with the diameter of the rod and the amount and intensity of the charge.

To test this by actual experiment I made the following arrangement: through a gun-barrel about two feet in length a copper wire was passed, the ends projecting. The middle of the wire in the barrel was coiled into the form of a magnetizing spiral and the ends of the gun-barrel were closed with plugs of tin-foil, so as to make a perfect metallic connection between the wire and the barrel. On the outside of the barrel another magnetizing spiral was placed, the whole arrangement being shown in the annexed sketch.



A powerful charge was now sent through the copper wire from a Leyden jar of about two gallons capacity. The needle within the barrel showed not the least sign of magnetism, while the one on the outside was strongly magnetic.

From this experiment, I conclude that a gas-pipe can convey an ordinary charge of electricity from the clouds as well as a solid rod of the same diameter.

The repulsive energy of the electrical discharge at right angles to the axis remains of the same intensity as in the case of a statical charge. This I have shown to be the case by drawing sparks of considerable intensity from a conductor, one end of which was connected with the ground while sparks were thrown on the other end from a large prime conductor. This spark is of a peculiar character, for though it gives a pungent shock and sets fire to combustible substances, such as the electrical pistol, it does not affect a sensitive gold leaf electrometer. The fact is, it consists of two sparks, the one negative and the other positive. The rod during the transmission of the electricity through it is charged + at the upper end and immediately in advance of this point it is charged — by induction, and in the discharge the electricity passes through it in the form of a series of + and — waves.

Yours very truly,

PROF. R. C. KEDZIE,
Lansing, Michigan.

JOSEPH HENRY,
Sec. Smithsonian Institution.

SMITHSONIAN INSTITUTION, }
Washington, D. C. April 15, 1876. }

R. C. Kedzie, Lansing, Mich.:

DEAR SIR:—Your letter was received by due course of mail, but a press of business connected with the preparation of the annual report for 1875 and the lighthouse board has prevented an earlier reply.

I now have to say that as far as I know I am the only person who has made

a special study of the conduction of frictional electricity in regard to lightning rods. It has long been established by Coulomb and others that the electricity of a charged conductor exits in a thin stratum at the surface, and this is a necessary consequence of the repulsion of electricity for itself, every particle being repelled from every other as far as possible. From this it was hastily assumed that electricity in motion also moves at the surface; but this was an inference without physical proof until I commenced the investigation. I found from a series of experiments that *frictional* electricity, that is, electricity of repulsive energy, such as that from the clouds, does pass at the surface, but that *galvanic* electricity, the kind to which Faraday, Daniells, De La Rive and others refer, passes through the whole capacity of the conductor. This latter fact, however, was previously established by others. I further found that whenever a charge of electricity was thrown upon a rod explosively, however well connected the rod was with the earth, it gave off sparks in the course of its length sufficient to fire an electrical pistol and light flocculent substances. I also found that in sending a powerful discharge from a battery of nine (9) jars through a wide plate that no electricity passed along the middle of the plate, but that it was accumulated in its passage at the edges.

From all my study of this subject I do not hesitate to say that the plan I have given of lightning rods is the true one, and that a tube of a sufficient degree of thickness serves to conduct the electricity as well as a solid mass, provided the thickness is sufficient to give free conduction. A very heavy charge sent through a wire frequently deflagrates it, but no discharge from the clouds, of which I have any knowledge, has ever sufficed to deflagrate a gas-pipe of an inch in diameter.

The plan of increasing the surface of a rod by converting the metal into a ribbon is objectionable. It tends to increase the power of the lateral discharge, and gives no increase of conducting power.

Another fallacy is much insisted on, viz.: the better conduction of copper than iron. It is true that copper is a better conductor of *galvanic* electricity, which pervades the whole mass, but in regard to *frictional* electricity the difference in conducting capacity is too small to be of any importance. Iron is sufficiently good in regard to conduction, and withstands deflagration better than copper; besides this, it is much cheaper.

Yours truly,

JOSEPH HENRY.

Whenever I read these letters of Prof. Henry I am struck with the great kindness of a man so eminent in science, who, amid so many and such weighty cares and responsibilities, will yet take the time to write such letters to one so little known as myself. They afford a striking illustration of the ennobling influence of science upon her votaries.

I am painfully conscious of the rashness of one in my position attempting to refute or even question a scientific proposition advanced by Prof. Henry, but especially on a question to which he has devoted so much time in original research and experimental investigation. But here is a question in science regarding the path of conduction of electricity of high tension through a metallic rod. On one side we have the statement of Prof. Henry claiming that he is the only man who has given special attention to the path of conduction of electricity of high tension, who states that conduction of this form of electricity is *at the surface* of a conductor; on the other side we have the statement of men distinguished in science who affirm that this, like other forms of electricity, is

conducted *through the mass* of the conductor and is not confined to the surface as in the statical condition.* The question thus arises, what is the path of conduction in electricity of high tension?

Some may ask, what does it matter whether conduction is at the surface or through the mass of a conductor? Why not rest satisfied with the fact that a metallic rod will conduct electricity without questioning closely the path of conduction? To these questions I offer two answers: 1st, the forces of nature will still act whether we recognize them or not; they do not suspend their action because of our ignorance; gravitation did not wait for Newton to discover its laws before it exerted its marvelous pull, which may hold a world in its safe path or overwhelm the luckless traveler with the thundering avalanche. 2d, the use of a scientific fact may outcrop long after the fact was discovered. The principle announced by Christ, "the truth shall make you free," holds in science as well as in morals. To know and obey all of nature's laws is the only path of safety; to know that we may obey is the supreme satisfaction of the human soul.

In entering upon this investigation I found in the text books only the results, and not the processes by which such results had been reached. As I had no access to the original papers, I was thus thrown upon my own resources for such investigation. Fortunately I had in Prof. Henry's letters an outline of the investigations by which he had reached his results. I therefore took them as the starting point in my investigations, and make them the basis of this essay.

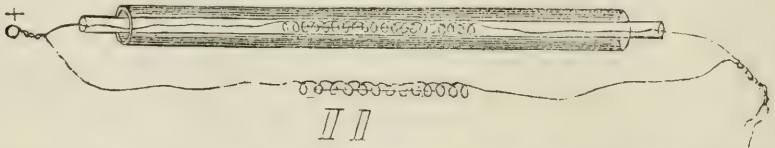
The experiment of Prof. Henry with a magnetizing spiral inside a gun-barrel is a very striking one, and at first sight it seems conclusive against the doctrine of internal conduction of electricity of high tension. I repeated his experiment and found the needle in the internal magnetizing spiral only very feebly magnetic, while the needle in the external spiral was strongly magnetic. Can these results be explained in any way except by the assumption of surface or exterior conduction? Two objections presented themselves to the inference of exterior conduction from this experiment: 1st, The gun-barrel has a large amount of conducting material compared with that of the contained wire. The experiment was varied by substituting a large glass tube coated with tin foil in the place of the gun-barrel, so as to make the amount of conducting material, external and internal, more nearly equal; on passing a strong charge of frictional electricity through this combination, the needle in the internal spiral was *strongly magnetic*. The experiment was again varied as follows: a piece of inch gas-pipe 26 inches long was substituted for the gun-barrel; in this a stout piece of copper wire (one-sixth inch in diameter), was inserted, the wire being coiled into a magnetizing spiral, and a steel needle being placed in the axis of the spiral; on passing a charge from a battery of ten two-quart Leyden jars, the needle in the internal spiral became magnetic, but less strongly than that in the spiral in the glass tube coated with tin foil.

This raised the question whether the electricity which passes by the internal wire expended the whole of its magnetizing influence upon the needle within the spiral, or was a portion expended upon the surrounding iron tube, whether

*Conduction.—In all cases where electricity is in motion, whether it be excited by chemical action as in the voltaic pile, or by friction, as in the common electrical machine, the force is conveyed by the entire thickness of the conductor; the charge is not confined to the surface, as occurs when the power is stationary and produces effects by induction only. In the case of the voltaic current as well as in the momentary discharge of the Leyden battery, by far the greater proportion of the induction occurs between one transverse section of the conductor and the adjacent sections immediately before and behind it; and but a small proportion of the induction, sufficient however to be distinctly manifest, is diverted to surrounding objects.—*Miller's Chemical Physics*, pp. 404-5.

gas-pipe or gun-barrel? This question was submitted to experiment as follows: Two spirals having the same number of coils were formed from the same piece of wire; in the axis of these spirals two needles as nearly alike as possible were placed; one of these spirals was placed in a long glass tube (to insure more perfect insulation), and this tube was placed inside a gas-pipe; the other spiral was outside the gas-pipe and a few inches from it; two ends of the wire were then made clean and bright, twisted together and capped with a brass ball; the other two ends were also made clean and bright, twisted together, and connected with the outside coating of the battery of Leyden jars.

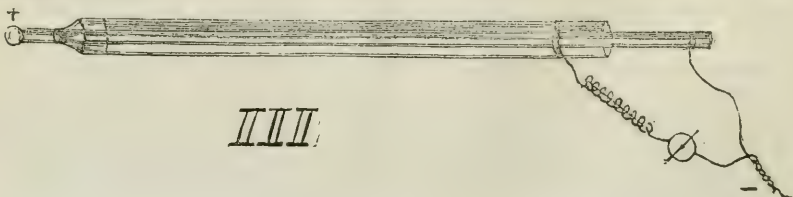
Cut II. exhibits this arrangement.



Here two perfectly equal paths were open for the passage of electricity, and if a charge were passed from + to - the electricity would divide and equal amounts pass by each conductor and the needles in both spirals would exhibit the same amount of magnetic intensity unless the iron tube exerts a modifying influence over the magnetizing power of the internal spiral. The experiment was tried repeatedly, and uniformly the needle in the internal spiral was inferior in magnetic intensity to the needle in the external spiral, usually in the proportion of 2 to 5.

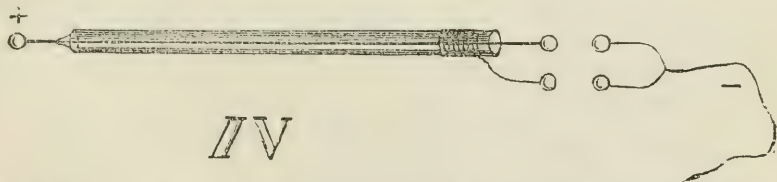
We thus see that the conditions attending Prof. Henry's experiment, instead of the simplicity which they at first sight seemed to have, were in fact quite complex. The intensity of magnetism developed in the needle in the interior spiral cannot be accepted as a true measure of the amount of electricity which passed through the interior wire.

Prof. Henry concedes that galvanic electricity has little or no repulsive energy, and passes through the whole substance of the metallic rod. The question then arose, can galvanic electricity be made to exhibit a similar tendency to surface action? To render the answer decisive the conditions of experimental proof were purposely made such as would favor an answer in the negative. A half-inch gas-pipe was used for the internal conductor; outside this was placed a long glass tube, covered for five-sixths of its length with tin-foil for the external conductor; the tin-foil embraced the gas-pipe at one end, while the other end of the foil terminated in a long copper wire which was coiled into a magnetizing spiral, and a very sluggish galvanometer was also introduced into this part of the circuit to measure the intensity and the direction of the flow of electricity; the wire from this exterior circuit was twisted up with a wire prolonging the gas-pipe. Cut III. will show the arrangement for this experiment.



On passing a current of galvanic electricity from + to —, the needle of the galvanometer was violently deflected, and a soft iron wire in the magnetizing spiral was made magnetic. This experiment reproduces with *galvanic* electricity the same apparent tendency to surface action, which was so strikingly exhibited in Prof. Henry's experiment with *frictional* electricity. In this experiment no one will attempt to explain this division of the current, and the passage of a part of the electricity through the exterior conductor by any assumption of repulsion which exists in the statical condition of frictional electricity, because galvanic electricity is devoid of all repulsion. Will not the following proposition cover all the essential facts in both experiments? viz.: the resistance to the passage of a current of electricity being directly as the amount of electricity, and inversely as the conductive capacity of the conductor, and electricity of the same kind having absolutely no cohesion, when two paths are open for the passage of a current of electricity the current will divide and pursue both paths—most by the path offering least resistance, and least by the path of greatest resistance.

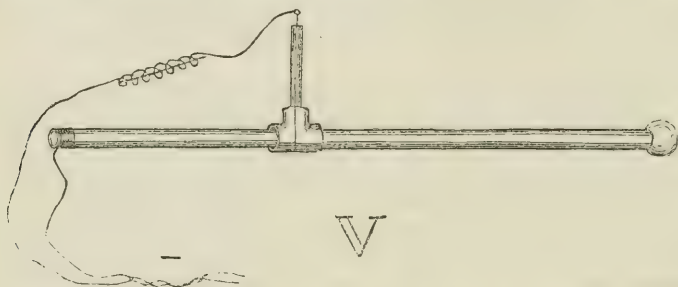
Since the gun-barrel exerts such a controlling influence over the magnetizing power of an inclosed spiral, the intensity of the magnetized needle in such a spiral was discarded as a measure of the amount of electricity which traverses such spiral, and some other more accurate means of measuring the relative amount of electricity which passes by the interior and exterior circuits was sought for. Failing in my efforts to construct electrical thermometers of sufficient accuracy for this purpose, *the striking distance* was finally selected for such measurement. A stout copper wire capped with a brass ball at each end was placed inside the gun-barrel: at one end it was brought into metallic connection with the gun-barrel by means of tinfoil, but insulated from it for the rest of the distance by a glass tube: an L shaped piece of the same kind of wire was bound to the other end of the gun-barrel by securely wrapping with copper wire; this L piece was also capped with a brass ball, the balls of the exterior and interior wire being opposite each other, and about three inches apart: a branched rod capped with brass balls, and terminating in a wire which could be brought in contact with the outside of a Leyden jar completed the apparatus, which is figured in cut IV.:



The arrangement in this apparatus so far as regards external and internal conduction is similar to Prof. Henry's; it differs from his mainly in the fact that the relative amount of conduction is not measured by the action of a magnetizing spiral, but by the distance across which a spark will leap. If conduction is solely at the surface, and there is no conduction by the interior mass of a conductor, then if the balls of the branched rod are placed at the same distance from the balls of the interior wire and the L wire, when a Leyden jar is discharged through this apparatus from + to —, the spark should always leap from the ball of the L rod to the contiguous ball of the branched rod, and never from the ball of the interior wire to the corresponding ball of the branched rod. When the experiment was tried under these conditions *the spark*

always leaped from the ball of the interior wire. This experiment seems to show that conduction of *frictional* electricity may be by the interior mass of a conductor as well as at its surface.

The experiment was tried to see if this kind of electricity could be withdrawn from the interior of a conductor during its passage. Into the opposite ends of a T gas-coupling gas-pipes were firmly screwed; one end of the gas-pipe was securely closed by screwing on a brass cap; into the third opening of the T coupling a glass tube was securely cemented, the glass tube being covered with shellac varnish to secure good insulation; a copper wire was passed through the glass tube so as to touch the inside of the gas-coupling, and the projecting portion of the wire was coiled into a magnetizing spiral; the free end of the wire was then twisted with a wire attached to the open end of the gas-pipe. Cut V. exhibits the essential parts of this apparatus.

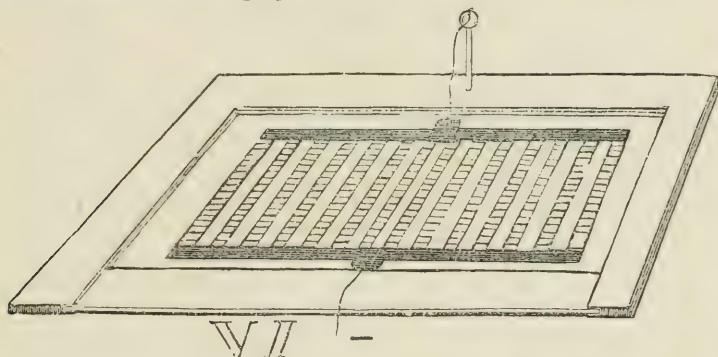


When a steel needle was placed in the spiral and a Leyden jar discharged through the apparatus from + to —, the needle was found to be magnetic, thus showing that frictional electricity may be withdrawn from the interior of a conductor during the passage of a charge of such electricity. A critical friend objected that the electricity was still withdrawn from a surface, although it was an interior surface. To remove this objection a cylinder of lead was cast, conducting wires being inserted in each end of the lead cylinder; a deep hole was drilled in the side of the cylinder, in which a glass tube was cemented; through this tube a copper wire was passed down to the lead, and the rest of the apparatus was arranged as in the former experiment. When a Leyden jar was discharged through this apparatus, the needle in the spiral became magnetic, as in the former experiment, showing that electricity during its passage could be withdrawn from the center of a solid body. These facts seem to me to be inconsistent with the supposition that electrical conduction is confined to the surface of a conducting body.

As another proof of the theory that conduction of frictional electricity is at the surface of a conductor, Prof. Henry cites the fact that when electricity is thrown explosively upon a rod well connected with the ground, a lateral spark may be drawn from such a rod. To examine this matter an iron rod was brought into good metallic connection with a large steam pipe (not in use) which was buried in the ground for more than 600 feet of its length, thus securing ample connection with the earth. When electricity was thrown explosively upon this rod from a large prime conductor, a lateral spark could be drawn from any part of the rod, and even from the projecting end of the steam pipe. On passing a metallic rod capped with a brass ball into the inside of the steam pipe the lateral spark could be drawn from the inside of the pipe. This fact seems to

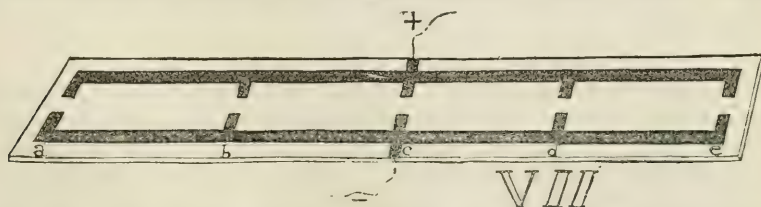
me to be irreconcilable with the statement that "the repulsive energy of the electrical discharge at right angles to the axis remains of the same intensity as in the case of a statical charge," because in the statical condition no electricity can be drawn from the interior of a charged prime conductor.

The question whether electricity sent through a wide plate will all accumulate at the edges and no part pass along the center of the plate, was submitted to experimental test as follows: parallel strips of tin-foil were pasted on a wide plate of glass, the ends being connected by cross strips of tin-foil; the parallel strips of foil were then divided into a large number of squares by drawing a sharp knife across them, so that the track of the electrical discharge could be traced by the light at points of interruption in the strips of foil. Cut VI. exhibits the arrangement employed.



On passing strong discharges of electricity through this apparatus, the path of the discharge was sometimes by the side strips of foil, but most frequently by some of the interior strips. It seemed to be governed by caprice,—rarely twice in the same path. Trifling variations seemed to determine its path, *e. g.*, the presence of moisture by the breath or a touch of the hand, or the proximity of a body upon which it could act inductively, such as a metallic rod under the glass. I did not find that uniform discharge along the edges which I had anticipated.

A modification of this experiment for class-room illustration is shown in Cut VII., where parallel strips of tin-foil were pasted on opposite sides of a plate of



glass six feet long; projecting strips at *a*, *b*, *c*, *d*, and *e* were placed at the same distance from corresponding strips from the opposite side; when electrical discharges were sent from + to — the spark usually leaped from *c* to the opposite strip, frequently from *b* and *d*, and rarely from *a* and *e*.

I conclude this subject by saying that, much as I honor the distinguished Secretary of the Smithsonian Institution, on reviewing the whole subject, even in the light of his ingenious experiments, I am led to coincide with the views of

the great mass of eminent electricians both in Europe and in America, viz.: that conduction of electricity of whatever name is through the mass of the conductor and not by surface action such as is exhibited in the statical condition of electricity.

THE APPLE ORCHARD.

BY PROF. W. J. BEAL, OF THE AGRICULTURAL COLLEGE, LANSING, MICH.

[The following paper was read at five of the Farmers' Institutes held in this State under the auspices of the State Board of Agriculture.]

LOCATION.

As in most other farm operations, especially if the man is young or has had but little experience, every one is likely to think he knows just how to plant and take care of an apple orchard in the best way. Yet no two men would pursue exactly the same course in raising a good orchard. A very little observation will convince all of us that many are not managing their orchards in the best way for appearance or for profit. We find trees set on all kinds of land. It is a common rule that apple trees will flourish on any soil that will produce good corn and potatoes, and yet not all orchards under the best of management will be equally fruitful and profitable on such soil. Some attention must be paid to the distance from market or a railway station. The position should be relatively high, in not a hollow or too much hedged in by surrounding forests. A high exposed situation, with a slight thin screen to the southwest, will be less liable to great extremes of heat and cold than one in a hollow or surrounded by dense forests.

I prefer a lot sloping slightly to the north as less liable to suffer from drought. If we can find a locality in which the thermometer does not go more than 20 degrees below zero, nor above 90 degrees, it is much to be preferred to one with greater extremes. But most people must do the best they can on the farm already in their possession. There are many farms in every county without very favorable spots for apples; still some fruit can be raised on all of them. Knowing what is the best, each must approach excellence as near as his circumstances will permit.

THE SOIL.

The most profitable orchards in our State, with rare exceptions, are those planted on strong or deep, rich land, having a clay subsoil within a foot or nearer the surface. For orchards, avoid soil which is black, approaching the soil of river bottoms or drained marshes. Sandy soil, without heavy subsoil, is likely to produce trees with short lives unless well fertilized.

PREPARATION OF THE SOIL.

The soil should be upland and naturally free from standing water at all times of the year. It is too often inferred that such land needs no tiling. I have yet to see the first orchard in Michigan, or in any other State, on heavy subsoil, which is not the better for tiles every two rods. No operation will bring a larger return for the labor than thorough drainage of orchards. It is unnecessary to

give all the reasons at this time. Unless the soil is new and just cleared of limbs, it should be thoroughly worked over and mellowed by a previous crop of potatoes, corn, or some other hoed crop, or summer fallowed. Now comes another important part of the work which is rarely ever attempted. Plow and farrow with one team and follow it with a plow drawn by three large horses, or two teams, on a big subsoil or trench plow put down as deep as the team can draw it. Work the surface over in suitable weather two to four times with the plow and harrow until it is all uniformly fine. The land will look better, though it may be little or no better, if it is now planed down with a plank scraper till all the small knolls are cut off and the little hollows filled.

SELECTION OF VARIETIES.

This, again, is devoted ground. No two persons, even with much experience, will ever exactly agree as to the selection of best varieties. One, perhaps, remembers a certain variety which just suited him in his boyhood, and he plants largely of that variety without any thought of its qualities for bearing, time of ripening or shape of fruit, without regarding the liability of the tree to winter kill, to grow in bad shape or split down. The Esopus Spitzenberg is an excellent apple for winter, the Yellow Bellflower also, but we have not yet learned how to grow them profitably. Tastes differ. For market we must be guided by the choice of the majority or by the choice of a minority if they are willing to pay extra prices. Occasionally there is a person who thinks there is nothing like the Black Gilliflower, but to the taste of most people they are only a second or third rate fruit. One thinks there is nothing like the melon apple; to others perhaps of the same family, this apple has a flavor positively disagreeable. At present the majority of our farmers find winter apples more profitable than those ripe in summer or autumn. Some of our most popular market apples (as the Baldwin) are not first quality. They are much raised because they bear well and are profitable to sell. In too many places, especially south and west, an apple is an apple and called nice if its color, shape and size are approved. But as our country grows older and produces more apples and the taste of the people becomes more cultivated, quality, in making good sales, is going to tell much more than in the past. This we know has been our experience in regard to butter, cheese, beef, mutton and poultry. As wealth increases people become more particular in taste, and there is much more difference in the price of good and bad articles of food. In some localities there may be a good market for autumn fruit for drying. This will have some influence on the varieties to be planted and the proportions of each. The model winter apple must be hardy, bear annually on moderate soil, must be long lived, fruit of medium size, skin rather thick, color red or yellow with a red cheek, quality fine grained, tender, not very sour and a good keeper. It is fashionable just now to recommend but very few varieties for cultivation. I think we shall soon change again and recommend a somewhat larger list. For a full list I can do no better than recommend my hearers to the list of fruits recommended by our State Pomological Society, p. 139, 1873.

I will mention a few of my favorites:

FOR SUMMER.

Early Harvest, Red Astrachan, Maiden's Blush, Early Joe, Primate. The last two for family use or select home market.

FOR AUTUMN.

Porter, Twenty Ounce, Lowell, Chenango Strawberry.

FOR WINTER.

Red Canada top grafted on to good native stock; Northern Spy well trimmed, fruit thinned and tree well cared for; Rhode Island Greening, Wagener, if served as recommended for Northern Spy; Jonathan, Westfield Seek-no-Further, Talman Sweet, Shiawassee Beauty, American Golden Russet. Every one, probably, will wonder why I have not added certain others he would mention. There are none in the above list to be ashamed of, nor are any of them perfection in tree and fruit. I would not rely upon one or two varieties alone for market in case that one or two might fail.

HOW TO SET THE TREES.

My choice would be as follows: Plant seeds of some vigorous native fruit, and when two years old set them in the orchard. When about five years old top graft the main upper branches. The second choice would be to go to the nearest nursery and select two-year old grafted or budded trees. Take those of uniform moderate size which have grown in heavy soil. Forced or very large trees of any size are more likely to die from winter's cold or summer's heat. "Large size" may be a good recommend in selecting a lamb or pig for eating, but not for young apple trees.

SETTING OUT.

From the time the roots are out of the ground to the time the young trees are set, keep the roots moist and out of the sun or dry wind. Pry the trees up and get all the roots possible. Trim the broken or rough ends. Do not dig the holes till the tree is nearly ready to set, as the soil will be in better condition. Digging holes for the small trees will not be much work if my directions for preparing the soil have been followed. Mark the ground in squares, two rods apart, or forty feet is better. When set in squares the trees are better situated for cultivating and driving between than they would be if set in quincunx. The roots will easily run all over the ground and get at all the good soil within twenty-five or thirty feet. I know of no better way to stake out an orchard than the one described in Thomas' American Fruit Culturist, p. 55. It is briefly as follows: Stretch a stout cord the size of a pipe stem along one side of the orchard where you are to set a row of trees; a line may be used 700 or 500 feet long. Pull it quite tight. Measure off the proper distance for each tree and tie a white string on firmly. Stick a small stake at each point. Move the cord on to complete the row if the orchard is large enough to require it. Stretch the cord across one end and stick stakes. Stretch it again on the other side and put in stakes for each tree. Again measure across the other end to see if the side rows are parallel. Then from near the end of the plat move the lines from stake to stake on the sides and then sink pegs for each tree. Place all the pegs before setting out any trees, so that any corrections can be made. Take a piece of board four inches by six feet, bore an inch hole near each end, cut a notch to the center on one side of the board at the middle. Place the board with notch against the pin where a tree is to set, put a peg in each hole at the end of the board. Remove the center pin and board and dig the hole for the tree. Replace the board and let the tree come in the notch in the middle of the board.

I prefer to set trees in early spring on a still damp day. Place fine surface soil on the roots, which should be spread in every direction in a natural way. Stamp the dirt in firmly as it is thrown into the hole. If budded or grafted, set the poorest side of the tree to the northeast. Let every tree bear a few inches to the southwest to meet our strong winds. Use no manure about the roots unless it be some pounded bones.

Mulch the soil at once with coarse manure, eight inches deep, extending four feet each way. The better the soil the less manure there may be in the mulch. After setting out no one should neglect to make a plat of his orchard, no matter if it is only a rude one. In this plat is recorded the position of each tree, when set and the name of the variety. This would save much trouble and confusion in future years.

CULTURE.

We might suppose this matter would be settled by this time, at least, so far as young trees are concerned. But people continue to buy trees and stick the roots into a hole with hard soil all around and plenty of grass or clover allowed to grow. I have, within two years, seen a young orchard set in a clover meadow within ten or twenty miles of Rochester, New York, where of all places on this continent we should suppose every man knew better. I have often seen young trees set in a wheatfield, which is not much better than in a meadow. The roots of clover and grasses often extend down into the soil four and five feet or more, and they rob your trees when not suspected. To be brief a young tree should be treated very much as you would treat a hill of corn. Hoed crops will answer in a young orchard; sowed crops will do much harm to young trees. As before mentioned, I think it a good plan to keep young trees mulched, and I am not sure but it is the best of all ways to treat large or old trees as long as they live. Mulch prevents the rapid evaporation of moisture from the soil, keeps the surface mellow, prevents the soil from often freezing and thawing in winter and becoming over-heated in summer. Whether or not to cultivate trees which have become well established depends upon circumstances. I have never seen an apple orchard which I thought was injured by too frequent shallow culture, but this may be the case in some places, especially in warmer climates or where the soil is deep and very rich. Upon this point I cannot do better than to repeat what has several times been in print, taken from one of my previous reports. Whether to cultivate or not can be told by the looks of the tree. If the color of the leaves is good and the growth all right and the trees bear well of fine fruit, they are doing well enough, even if in grass. But if the leaves are pale, the growth of the annual twigs much less than a foot in length on trees set twelve years and the fruit small and poor, something is the matter, and they are suffering for want of plow, harrow or cultivator, or a heavy mulch or coat of manure, or two or more of these combined. The upper twigs of trees set twelve to twenty years ought to grow six to twelve or more inches each year. To judge of the condition of an apple tree is much like judging of the condition of sheep in a pasture. To determine the latter point, look at the sheep and not at the pasture. As long as the sheep are plump and fat they are all right. Some experiments on culture of orchards have been going on at our college for several years. They have attracted much attention. For a full account see my lecture on experiments, and my report for this year and previous years printed in the report of the State Board of Agriculture for 1876. I may give a little here. Digging little circles about trees and keeping the ground mellow

and nice has very little effect. Sowing patches of grass about trees in cultivated orchards has almost no effect. The reason is plain. The roots run all through the soil between the rows. The small spaces referred to are only a small part of the whole surface used by each tree. The fruit in the college orchard is of better color on trees with no culture and in grass, but the quality for eating is much superior when grown on trees which are well cultivated. At least this has been the case with Northern Spys the past season. If cultivated, I believe in sowing orchards to buckwheat, rye or oats, or allowing the weeds to grow after the middle of August. Moderate culture of trees on good ground seems to take the place of mulch or manure about trees without culture. The culture is cheaper than the manure. A little culture and a little manure each year is a good thing for apple trees. The best orchard in the State, or the one which has received the first prize for two or three years, stands on rich soil with heavy subsoil. It belongs to Mr. L. H. Bailey, of South Haven, who manures it very heavily every year and cultivates it, taking off a good crop of fine fruit and also a good crop of corn, wheat, oats or some other farm crop. I need hardly add that ashes, lime, old plaster, muck and other substances are often valuable for apple trees.

PRUNING.

Here, again, we are on debated ground, strange to say, although people have been thinking and practicing two thousand years, yes, three or four thousand years. After all that has been said and done by the agricultural press and by our eminent pomologists in every part of our country, still a well pruned orchard is the rare exception and not the general rule. The reasons may vary with different persons. Many do not know how to prune in any approved method, and are too heedless to inform themselves by reading or inquiring. Trees grow fast. Limbs are rapidly multiplied. The general farmer has irons in the fire. He is very likely to neglect some things, especially in the growing seasons of the year. Some prefer low trees, some high trees; I prefer them with limbs starting about five feet from the ground. A very common mistake in trimming is to cut out and keep cutting off the main stem or leader of the tree, and allowing two, three or four large limbs to grow out near each other and spread in every direction. Such trees, especially of some varieties, are quite likely to split down or decay in the fork before they live to bear many large crops of fruit. The better way is to encourage a strong central stem or leader from which branches may be allowed to run out in every direction. Do not allow branches to come out or grow to be large nearer each other than eight inches, one above the other. By this I mean, if one branch starts out three feet from the ground the next branch ought to be eight inches higher up the main stem. Whatever you do, avoid cutting off large limbs—limbs over one inch in diameter. No matter if they do cross and look bad, go farther out and cut off many small limbs rather than a few large ones. Thin out small limbs from the ends as a barber thins hair. The lower limbs of a tree die because the limbs above them are too thick. If kept thin enough, fine fruit will grow on the lower limbs as well as on any part of the tree.

There are some advocates for pruning in each month of the year. I prefer to prune just as the buds are starting out. Keep the "water sprouts" rubbed off while tender two or three times during the summer. Cut the limbs off close so as not to leave an ugly stub.

I must not close this portion of my subject without making a stern protest.

against butchering trees as some ignoramuses do who prune once in three to seven years, and then use an axe and saw and remove half the top by lopping off large limbs. They use a paint dish to cover the large scars. They make a great show in a little time with a small amount of work. They let in the light. They usually think they are doing a good job. If a lamb's tail, or the tail of a pig or pup is to be cut off, cut it off at once in the proper place. This is reasonable. But not so with a tree. If you wish to change its shape when it has grown large and has been neglected or not pruned to suit you, make the change gradually. Cut off a little each year. It is better for the tree to prune too little than to prune too much, far better to prune a little often than to prune heavily once in three or more years. A few small limbs may be cut off in summer. Small twigs cut then will tend to induce fruitfulness the next year.

Healing quickly on the outside does not always leave the tree sound on the inside. In June or July a wound heals over most quickly, but a few experiments indicate that the wood below is more decayed than is found below limbs which are cut off in spring.

THINNING FRUIT.

Upon this subject most of our farmers have much yet to learn. They have learned that corn may be crowded,—that they have no reason to expect six or ten or a dozen good bearing stalks to each hill. The young plants must be thinned to produce a profitable crop, only a limited number must be allowed to grow. So it is well known to be the case with turnips, carrots, and many other crops. It is worse than folly to prop up fruit trees to prevent them from breaking down with fruit. By over bearing, trees become exhausted, often causing premature death. They rarely bear two large crops in succession.

No operation in the orchard will pay better than systematic thinning. Every one who has tried it is certain of the fact. Good pruning takes off many flower buds, but often too many are left to set more fruit than the tree is able to bear. It seems to exhaust a tree less to produce a bushel of large fruit than the same amount of small fruit. To produce the seeds is one of the most exhaustive efforts of any plant. A small apple is likely to contain as many seeds as a large one.

On the day I was preparing this portion of the present paper I remarked to one of the best farmers in our neighborhood that he had let his timothy get too ripe before cutting it; that nothing exhausted plants of any kind more than to allow them to go to seed. He said he knew it, but he once thought the reverse was the case. He used to let his grass ripen before cutting so as not to injure the roots. But by chance and observation he had discovered that the back part of his meadow where he had always mowed last ran out or decreased in yield much more rapidly than where he cut his grass first every year. The law above referred to was well known to botanists a long time ago. Large numbers of instances could be given illustrating the importance of more knowledge of different branches of science. I was speaking of thinned fruit. The large fruit will sell for the most money. It is worth more to eat. By judicious thinning for some years a tree will raise as many bushels, perhaps more, than if left to bear too much. Of course there may be some trees or some varieties which will not need thinning. If properly attended to in this respect, trees will bear, or be much more likely to bear, annually. Trees, if left to themselves, often have their years for bearing and their years for resting. Thin freely and get a smaller crop every year. In years like the past one when there is likely to be an

abundance of fruit, thin freely, perhaps in some cases take off all the fruit; as a consequence the tree will be likely to remain vigorous and the next year bear well, just when a good crop will be worth something. It is not much work to thin apples when they get the size of your thumb. Till one gets used to it he will not thin enough. Small apples make less show than large ones. To those wishing to make money out of their apples, and to those wishing to have enough good fruit every year I will say, give this subject careful attention, give it a fair trial. No one was ever known to abandon the practice who had given it a fair trial.

DESTROYING ORCHARD INSECTS.

For a full discussion of this subject, in which are names, descriptions, details as to habits, etc., see Professor Cook's excellent pamphlet included in the report of the State Board of Agriculture, p. 123, 1874.

In this connection I will only give a brief summary of the best known methods of destroying orchard insects.

THE CODLING MOTH, OR APPLE WORM,

is unquestionably the worst insect in the apple orchard the people of our State have to contend with. At present these insects are in the worm or larva condition, and are tucked away in a small web under the scales of rough bark, in old stumps or chunks, or birds' nests; in our cellars, under the barrel hoops, about apple bins, in all sorts of cracks and corners. From May to the last of June, and earlier if the weather is not too cold, they will appear in the winged state. They fly in the night and are rarely seen in the orchard when in the winged condition.

The female will lay an egg in the blossom end of each of about fifty early apples, beginning as soon as the apples are set. The eggs hatch in about a week and eat their way into the young fruit. The larva grow to full size in about four weeks and leave the apple for some place to hide and go through further transformations. In some cases the apple falls, carrying the worm with it, but in half the apples or more the worm leaves before the fruit falls. A succession of worms keep hiding away and then coming out as perfect insects till about the last week in August. They at once lay eggs in the blossom end of the late and winter apples. So there are two broods or two crops of apple worms in a year, the early crop and the late crop. Those of the second or last crop remain as worms till the following winter or spring.

Hogs are a good remedy, as far as eating worms in the apples is concerned. But frequent and extended experiments show that half the worms or more never go to the ground at all—that they leave the apple before it falls. Of those which fall to the ground in apples, many leave at once and crawl up the tree. We must keep wire screens on our cellar windows to prevent moths escaping in spring. We must hunt the nests about sheds and barns where apples are stored in autumn. We must destroy old birds' nests and all sorts of rubbish about apple trees. We should scrape off the rough bark. I am suspicious about coarse mulch, as it may harbor insects. As soon as the apples are the size of robin's eggs or sooner, tie bands of thick stout paper about the trunk of each tree. A woolen cloth four to six inches wide is the best. This cloth or paper will be handier if only of one thickness, because otherwise the moths will crawl into all the folds and thus make it more difficult to kill them. If the material is tough enough it may be held in place with one carpet tack pushed half way in with the

thumb, if the thumb is used to hard work. If too tender and liable to be torn off by wind or birds, the paper may be held in place by a string tied around the tree.

The warmer the weather the more lively the insects in growth and activity. In no case is it safe to allow the bands to remain more than nine days without changing or removing to kill all the worms. If left ten days I have found that some of them may have escaped. In careless hands, then, these bands may do more harm than good. Change the bands in this way on the bearing trees till about the last of August, when they may be left on undisturbed till late in autumn or in the winter.

I have heard men say, and men, too, who were called very intelligent, that our farmers would never go to all this labor and trouble to save their apples. By actual account for several years it has not cost over six cents a tree for labor and material to kill the moths as above explained. The man who will not take this trouble to improve his fruit deserves to be called "lazy," and to eat wormy apples and to sell at low prices.

THE MOTHS FLY.

It is not enough for isolated farmers to thus kill them. Whole communities must work together.

At South Haven, before catching moths as above described or in similar ways, they had only one perfect apple at a fruit show. Now they have fewer wormy apples. There is much yet to learn about the apple worm, but if all would do as well as some men, our apples would be much improved.

A few men have thought there was a great chance for getting good fruit by sprinkling slacked lime all through the trees when in flower and a few times after this later in the summer. The moths seemed to be driven away on account of a dislike to the lime.

THE OLD APPLE TREE BORER AND THE FLAT HEADED BORER

lay eggs on the bark of the trunk where they hatch and eat their way in through the bark. The former insect is usually found near the ground and eats into the wood, the other, the flat-headed borer, is usually found farther up the trunk and on large limbs.

I have spoken of scraping the trees. To kill the eggs and to prevent them from being laid, the trunks of trees should be thoroughly scrubbed every year about the first week in June with hot soft soap. A cheap sheet-iron pail can be made having a second bottom below containing room for a kerosene fire or lamp of some kind or charcoal or pine wood. The whole can be kept hot and carried from tree to tree. Later in the year, or at any time, the bark should be examined and suspicious places dug into with a knife and any borers killed.

CATERPILLARS

should be hunted and destroyed whenever they can be found in orchards and on neighboring trees of the black cherry. The prospect is that we shall soon need to fight the canker worms to save our orchards. Look out for them.

MICE.

To prevent mice from gnawing trees, late every autumn pile up and spat down a smooth conical mass of soil about each young tree, making the mound eighteen inches high. This should be removed again in spring.

HARVESTING FRUIT.

A few men in our State are regularly getting two or three times the usual prices paid for apples because they have won a good name by always taking great care in harvesting and packing. Every man will likely pursue a course different in some respects from that of every other man. I have the packers use a common grain bag hung over the shoulder. The fruit is carefully emptied into a light cushioned box a few inches high and two by three feet in size. The box is lined with any cheap material, with some fine hay to make it soft on the sides and bottom. This box sits on two light horses about as high as a barrel. From this box the apples are assorted into two or three grades.

They are packed headed, and placed in an open barn or under a shed till some time in November. The cellars should be freely ventilated to make them cool in autumn. Keep a thermometer in the cellar and watch it. Ventilate on suitable days to cool the air down to about the freezing point. Keep the windows closed on warm days. Two thicknesses of newspaper closely tacked over the windows will be a great help in cold weather to keep the frost out. For the good of the apples in store and for the good of the health of the people in the house, enough attention is not paid to the ventilation of the cellars. With extra fruit line the barrels with paper and place a layer now and then across the barrel.

LEARN TO USE MORE FRUIT.

Many of our farmers were not accustomed to have much good fruit when they were young. They learned how to get along without it. Now fruit is plenty and cheap they should contrive more ways to use it. They should have fruit handy at all suitable times; they should encourage its use in an uncooked condition, and also when prepared in a variety of ways. Apples I believe to be wholesome. Even green apples used moderately are not objectionable.

RAISING FRUIT AS A BUSINESS.

To make the orchards more profitable our people must give them more attention. It is too often the case that a farmer puts but little labor on his orchard and in autumn he expects, and sometimes finds it to be the most profitable part of his farm. To be more successful he must make more of a business of it. In the long run care, study, and intelligent labor will bring good returns in the orchard as it has in the care of stock, in ditching, good plowing, or selecting good seed wheat. Our people need to know more of the habits of insects, more of animal and vegetable physiology, more of chemistry, mechanism, political economy, and more of everything in the line of an education, not only to make them good citizens, but to enable them to get better returns for their labor. We need to become familiar with what has already been discovered and become well established, and we need still more to see the importance and profit in doing things according to the most approved methods.

As our country grows older extra care will probably produce better fruit. On account of the greater competition the raiser of poor fruit will find it unprofitable and quit the business. The proper management of each variety will be better understood. Slipshod pioneer farming is fast ceasing to be profitable, at least in southern Michigan. Brain work with hand work, study with practice will take the ascendancy and occupy the fields, the orchards, and the gardens.

FARMERS' HOMES.

BY E. G. BAIRD, SECRETARY OF STATE BOARD OF AGRICULTURE.

[Read at Greenville, Traverse City, Ypsilanti, and Hillsdale Institutes.]

It is hardly possible to name a subject so far removed from human sympathy as not to be capable of being made interesting when touched by the magic wand of a writer's genius; while without that touch themes in themselves of great interest and importance are dull and uninteresting in their presentation.

It is my good fortune on the present occasion to have a theme to present in which it may be presumed that we are all deeply interested, and to which the speaker, without any claim to the magic power of genius, may hope to hold your attention during the time allotted to its discussion. For what is there on all this wide world of greater interest to us than our homes? How important is home, even in its material aspect. The air we breathe, the water we drink, the food we eat, the rooms in which we sit, the grass and flowers among which we walk. these and a thousand other more or less subtle influences are promoting to a beautiful and healthful symmetry, or dwarfing and disabling the body in which the soul lives and through which it acts. In view of the intimate relation between the physical and the spiritual, how important becomes every item of home convenience and comfort. With what a dignity it invests even its mechanism and furnishing. Physical comforts and conveniences do not, however, constitute a home. Amid these the inmates may live, and in the ripeness of their years die, without having had any experience of a home in its truest and best sense. These must be transmuted into life and love to constitute what is worthy to be called a home.

We are doubtless interested in the various associations with which we are connected and desire their prosperity. The man who feels no responsibility with reference to his social relations, who would not give of his time and money and personal influence to help forward the religious, educational, and other organizations by which he may be helped and in turn be rendered more helpful in the development of all that pertains to a true manhood and womanhood, is a very poor specimen of a citizen, certainly not such as we are likely to find at a Farmers' Institute. Yet these social organizations do not lie so near our hearts as do our homes. We love them none the less because we love our homes more.

Some one has suggested that the three words in our language which call up the most tender and endearing associations are the words "mother, home and heaven." Did it ever occur to you how intimately these words are associated together. For "what is home without a mother" as its very soul and center, making it the one spot on earth where youth can unburden all its sorrows, and to which memory recurs in after years with a throb of joy, and will recur as long as memory endures.

Then the words "home" and "heaven" are hardly less intimately associated, for when He who spake as never man spake drew that matchless picture of heaven which takes hold of us as no other ever did or can, it was in these words: "My Father's house." How suggestive of what our homes should be and of what heaven is. The former to be the school of all excellence, a place where dissatisfied looks and angry words should never come, where no kind office is left unperformed, a place where the sky is always clear and the sun ever bright; the latter a place where all the best things of earth shall be fully realized.

An important consideration in connection with the household is the house,—the material structure or building in which the family live. There are many comfortable, convenient, and even elegant houses in our State, especially in the older and more improved portions of it. Yet the number of such houses is small as compared with those that are inelegant, inconvenient, and uncomfortable. This is not always from lack of the means necessary to provide what is better, but not unfrequently from the fact that the tight-fisted occupant is unwilling to make any investment that does not yield an annual return of ten per cent.

It is a fact that I presume will not be disputed by any, that country houses are generally less convenient and comfortable, and do not exhibit as much refinement of taste as the houses that are occupied by a similar class of people in our towns and villages. I think it will be at once apparent that this disparity ought not to exist, and in fact cannot exist without entailing the most disastrous consequences. The country home should of all others be the most attractive. The isolation of country life as compared with life in the city makes the attractions of home a more absolute necessity, doubly enhances their blessing and causes the want of them where they are lacking to be more keenly felt. In the city many of the long evenings are spent at the concert, the lecture and the opera, but in the country they are usually spent at home. The business man of the city may talk over the haps or mishaps of the day to his evening associates at the club, but if the new horse has shown a disposition to balk, or attempted to run away, if the cow has kicked over the milk pail, or an unruly buck has upset both milk and milker in the yard, the farmer tells it to his wife as they sit by the cosy evening fire.

One of the evils much complained of in our time, and one for which a remedy must be found or the days of our national prosperity will soon be numbered, is that so many of our youth born and brought up in the country rapidly develop a distaste for rural life and agricultural pursuits, and without casting even a lingering look behind them, leave the old home and the paternal acres to seek a new home, new associations, and new occupations in the city. There is a constant and disastrous drain from the farming population of its brightest intelligence, its most stirring enterprise, its noblest and most aspiring natures—of all those elements which are necessary to elevate the standard of agricultural labor and make it what it should be. I have neither the time nor the disposition to go into statistics bearing on this matter, yet it is a fact that in some of the older States thousands of acres once tilled are lapsing into forest, and all over the country farming lands for a number of years past have either deteriorated or made no advance in value as compared with the improvements put upon them, except such portions as may be situated in the vicinity of cities and large towns.

There may be a number of causes for this drain from agricultural pursuits, but prominent among them we believe to be the harsh contrast between actual farm life and life in the city, a contrast which would entirely disappear, or turn in favor of rural life, if farmers' homes were all that they should be.

I know of farmers whose farms are paid for and have been for years, whose income from their farm has enabled them to buy adjoining land, improved stock and implements of husbandry, and to put money out at interest, and yet living in houses almost destitute of comfort or convenience—with no visible touch of refinement within or around them; no ornamentation surrounding the dwelling, except perhaps a variety of farm implements strewn around bleaching

and cracking under the influence of the weather, and a dilapidated hog pen in disgusting proximity to the house. Stepping inside you find it equally unattractive; no carpet on the floor, nor picture on the walls; no books nor ornament, nor anything to indicate that any other than the lowest type of physical life has its wants supplied here. It is no wonder that the children brought up in such a home should learn to despise it, and should choose any other calling than the one with which they have learned to connect all these ungainly and unattractive associations. Some one has defined an agricultural college as a place where farmers' sons are weaned from farming. We have known not a few young men to go forth from the Agricultural College with a more intelligent appreciation of, and a more ardent love for agricultural pursuits than they would have been likely to attain under any other circumstances, and we have known many more who were most effectually weaned from all desire ever to become farmers through the harsh and unattractive aspect of farm life presented by their early homes. But wherever you see a farmer's home that is the embodiment of solid comfort and liberal taste, the scene of an exalted family life which shall be the master and not the slave of labor, and of a bright and happy social atmosphere, you will find daughters who will not be afraid to marry a farmer, and whom no farmer need be afraid to marry; and you will find boys who will not be in haste to seek in other callings a more congenial style of life, but who will stick to the occupations of the farm which have blessed their youth with health and plenty, with individual development and a virtuous growth.

It would scarcely come within the scope of this address to dwell at much length upon the building to be occupied as a home, either as regards the most suitable material for its construction, its location, or its general plan; and yet there are considerations of such intrinsic importance connected with this part of our subject that they demand more than a passing allusion,—in fact they cannot be studied too much, or understood too well by those who undertake to build. Every farm should have a good comfortable house suited to the wants of the family and in keeping with the extent of the operations to be carried on upon the farm, as soon as it can be provided. Our wants of course are to a considerable extent what we make them, and perhaps to a still greater extent what the prevalent social customs about us make them. We might name many things that have long since ceased to be classed as luxuries and been fully installed as necessities that a generation ago were utterly unknown. If any of us can bring up from the experience of our childhood recollections of pioneer life, we may well know that under our present circumstances we cannot repeat that now. If then the family lived in one or two rooms and our mothers baked bread in the round iron oven on the hearth, and suspended the kettle on the crane over the blazing chimney fire, never yet having dreamed of "tie-backs," though admirably adapted for such a situation, they toiled on in their humble way in the hope of something better by and by when the forest had given place to cultivated fields of green pasture and golden grain. For us to be satisfied with such homes, and to have our wives and daughters destitute of all the modern comforts and conveniences which help to ease life's burdens and raise life itself to a higher plane would be a dishonorable retrogression and a stupendous folly. At the same time I would not recommend putting in and upon the house any more to beautify it and render it convenient than your circumstances will permit. Foolish extravagance is no less reprehensible than a stupid parsimony. The farmer's house should be located near the principal thoroughfare, allowing sufficient room in front for a pleasant lawn, which a refined taste can render

beautiful and attractive, with but a small outlay of money, by a judicious selection and location of shrubbery and flowers.

When it can be obtained, the house should stand on a slight elevation, as it is a matter of the first importance to secure good drainage, not only to carry off the natural waters of the soil, but also the waste water and slops from the wash-room and kitchen. Learned sanitarians have fully set forth the evils of damp cellars and of dampness retained in the soil around the house. The most overwhelming proofs that such a condition engenders disease and death have been set forth by the American Medical Association. A paper read before that body by Dr. Kedzie on "Drainage in Michigan," viewed in relation to the public health, shows conclusively a very marked decrease in malarial fevers as the result of underdraining.

Says a recent writer on water supply and drainage [I here quote from Prof. W. H. Brewer's address in Report of Connecticut State Board of Agriculture for 1875]: "It is often a rather troublesome matter to get well rid of kitchen slops. If we look about farm houses sometimes we find a spout running through the back wall with an ill-smelling puddle back of the house, with flies in abundance, and a rank growth of weeds just on the margin. Sometimes there is a tub under it and periodically the men of the family carry it out into the garden as manure. Sometimes it is conveyed further away by an open gutter or by a leaky wooden trough; but in most cases it partly soaks in the ground beside the foundations or near the house, or partly evaporates, partly oxydizes by the air. In particular conditions of the weather it may get into the well. If underground, the soil pipes are often leaky and the earth all around gets saturated. Under any of these conditions such is the purifying action of air and soil that *usually* there is no actual disease; but all at once, without previous notice, some decay, or ferment, or change may occur, when disease-poison is generated; then comes fever, or diarrhœa, or dysentery, or some other one of these evils." Whatever you do with your slops do not let them ferment and decay in some dark corner near the house. Usually the best method of getting rid of this nuisance is by a tight drain to carry it off to a proper distance. The drain should be cleansed at intervals by pumping or pouring into it a liberal supply of clean water.

I have said that in order to secure good drainage a slight elevation should be chosen as the site for the house. If this cannot be obtained, and especially if the soil is of a clayey nature, begin the cellar wall but little below the surface and fill in around the house with a gravelly soil.

As regards the material with which it is best to build, much of course must depend upon circumstances. In this State there are but few localities where stone suitable for building purposes can be conveniently obtained. In ninety-nine cases out of a hundred where the choice of material becomes a practical consideration, the choice will lie between wood and brick, or a combination of both.

Wood is the cheapest, and in most localities *much* the cheapest, material with which to build; and houses, both beautiful and comfortable, can be constructed of wood from the top of the cellar wall to the peak of the roof. Brick, however, is preferable on account of greater durability, comfort and beauty. These qualities, it is claimed by many, can be equally well secured at less cost by the balloon frame veneered with brick; that is, lined around the outside of the frame by a four-inch brick wall. Quite a number of houses are now being built in this way; they look well and are dry and warm.

I shall not enter into the details of the drawing of plans and the arrangement

of rooms; people's ideas and tastes are so varied that almost any plan will have some who will admire it and some who will not. If you are going to build consult your wife if you have one, and if you haven't one, get one. Somebody has said that God first made a man and then He made a woman to tell him what to do. I think this is eminently true about the planning and arranging of a house. How frequently we hear men discourse eloquently on the duty of wives to make home pleasant for their husbands, poor afflicted mortals (the husbands, I mean). I do not think there is any less necessity to remind husbands of their duty in regard to building houses with a view to the comfort and convenience of their wives. The husband probably spends but a small portion of his waking hours in the house, but there the wife and mother spends her life. Her *work* is there, and while money is freely spent for whatever will facilitate and lighten labor outside, how often is it withheld or grudgingly expended for working conveniences in the house. Not only is the house the woman's workshop, and as such she has a right to plan and arrange it, but it is also the scene of her pleasures and the seat of her power; there she radiates those influences which are fixing the habits and moulding the characters of those who are soon to mould the destinies of the world. Every thing in the home and its surroundings that can contribute to its brightness and its joy will tell through the mother beneficially upon the children from the earliest beginning of life onward.

There is one thing more I wish to say on this part of my subject. Do not spoil your home comfort by a foolish extravagance in the building of your house. Some people do not seem so much to think of their necessities when they are going to build as they do about the new house their neighbor built last year, and they must build a little nicer than that, so we sometimes see houses that remind us of the preposterous ostentation of the Roman Cenecio, who to show his affluence walked the streets in shoes large enough for two. Build for shelter; build for comfort; build that you may exercise hospitality; build to illustrate your artistic longings, if you have any: in short, build according to your tastes and your necessities, but do not go to the utmost possible limit of expenditure in order that passers by may stare and say, "see what a grand rich fool is living here!" The same love of show is sometimes as manifest in the furnishing as in the construction of a house. Darkened parlors whose windows serve for no other purpose than a setting for lace or damask, an elegant reserve of walnut and rep carefully protected from the dust and the children; a veiled monument to be uncovered only on great occasions and to delight the astonished gaze of distinguished visitors. I like a house to be *in every part of it a home*, to have the air of being lived in all over. I do not want to have a room so fine or grand that the glad some sunlight and the laughing, boisterous children must be shut out of it.

A house with the necessary conveniences, and also attractive in appearance, both as regards its construction and furnishing, need not be very costly. Most of us are not wealthy, and the practical question with us is how to make home cheerful and beautiful with the means we can legitimately devote to that object. In order that every room in the house may be charming and home-like, expensive furniture is not essential. A carpet on the floor, a few pictures on the walls, and such ornaments as daughters of taste and refinement can readily make, a window full of plants with the light of heaven gilding their fresh green leaves and gay blossoms, a hanging basket, an aquarium: these things cost but

little and yield a large return in the influence which they silently but constantly exert.

I do not know that we can do anything that will be more effective in the promotion of public virtue than to cultivate the love of home, and in order to accomplish this we should do all in our power to make home lovely. Beauty being a recognized form of power, we would therefore say make your homes beautiful. Do not neglect those charms which good sense and refinement can so easily secure. It costs but little to have some flowers and shrubbery in your yard and to surround your dwelling with those simple beauties which delight the eye far more than many costly objects. If by preparing the soil and putting in the seed you will, as it were, furnish the canvas on which dame nature can work, with dew and rain, and light and heat, she will do more to adorn your yard than all the artists that ever lived. She loves to brighten the landscape by throwing her mantle of beauty over many an unsightly thing. She hangs ivy over the ruin, and twines the vine gracefully around the withered tree. Over the vegetation of the past now decayed upon the ground she spreads her green carpet of moss. She practices a thousand arts to awaken the senses and to please the mind. Let us follow her example, and do for ourselves what she is always laboring to do for us. God has chosen beauty as one of the forms of power. We never see creative energy without something which looks beyond mere existence, and hence the whole universe is a teacher and inspirer of beauty.

We should encourage all those innocent sports and amusements which shall contribute to the joyousness of home. Much has been written on the subject of amusements, and I do not know that it is possible to name a single form of them that has not been condemned by men who seemed more anxious to avoid little sins than to develop great virtues.

Public places of amusement are generally fraught with danger in consequence of their bad associations, and we think one of the best safeguards we can throw around our children will be found in such a recognition of their joyous instincts as will lead us to provide liberally for the gratification of those instincts at home, where we can control the selection of their company and prevent unseasonable hours.

Some may be ready to ask, "What sort of amusements are admissible in our homes?" I do not attach as much importance to this question as many do; because of the amusements likely to be indulged in at home one is about as harmless as another. In my estimation it is not the minor details of conduct, but the supreme objects of human life and the broad principles of purity, integrity and honor that should receive our chief thought. With regard to particular forms of amusement opinions are constantly changing. What one generation prohibits another sanctions.

I do not suppose that novel reading would be considered by any of you as a questionable indulgence. Devout people of the past generation almost unanimously excluded novels from their homes. But the character of novels has so changed that their condemnation has been pretty generally, and ought to be universally canceled—, a condemnation that never would have been uttered if Charles Dickens, George McDonald, George Elliot, Mrs. Stowe, Miss Muloch, and others of their class had written such novels in their day as they have in ours. There are, however, a few people yet living who do not know that Sir Walter Scott regenerated fiction, and they still regard with distrust some of the noblest and brightest creations of modern genius on the ground of what was

said "by them of old time" concerning books that most of us would throw into the fire with disgust at their impurity or contempt for their frivolity.

The question, "Shall we permit dancing in our homes?" is one now in dispute. Opinions have changed also with reference to this agreeable diversion, once regarded as the pet delusion of the evil one. It is now much more favorably regarded, and is permitted in many Christian homes.

The sweeping moral objections that have been made to dancing are an insult to thousands of as pure-minded men and women as there are in the country. If dancing is allowed to interfere with regular and orderly habits of life, it is objectionable; but as it may be indulged in at home, it is an innocent and beautiful amusement. It is as natural for children to dance as for birds to sing; and indulged in at home in the early hours of evening would be conducive to health and those graces of person and carriage that enhance God's physical gifts. But why should I tarry to specify amusements, believing, as I have already stated, that those likely to be indulged in at home, if never sought after in places where the corrupting influence of evil associations are sure to be felt, are perfectly harmless. Let there be cultivated in the home a fervent love for what is pure and just and honorable, a cordial abhorrence of what is sensual, mean, tricky, and ungenerous, and there need be no fear of the influence of the amusements in such a home, whatever they are.

Every home should have a liberal supply of good books. There are many things that we can better afford to be without than books, and but few that we can so ill afford to be destitute of. Books are not furniture, and yet they constitute the best furnishing that a house can possibly have. A family that is content to walk on cheap carpets and to have the plainest of furniture in order that they may have the fellowship of good books, at once rises in our estimation on our discovery of the fact. Children learn to read in the presence of books, and as they read the love of knowledge grows.

In the farmer's home more than in any other a library is an absolute necessity. These homes are more or less remote from the circulating library of the village and from the winter course of lectures. Being thus rendered more dependent on the resources of home for mental quickening and the improvement of the long winter evenings, there is a greater necessity, both morally and intellectually, for the enjoyment and stimulus of a library. We have been speaking of the importance of home attractions. Few things will make home more attractive than a judiciously selected library. It is impossible to over-estimate its influence for good. Through the perusal of good books pure and elevated tastes are formed that will abide forever, strengthening the individual to resist temptation, and leading in ways of virtue and wisdom.

The farmer needs a library not only as a home attraction, but also that he may successfully prosecute his calling. His is a profession that requires study as truly as any other. The best understanding of agriculture is possible only to him who has a knowledge of the physical sciences. The farmer requires also a large practical knowledge of men and things, of the laws of barter and exchange, in order to success. Farming is a profession which calls to its aid science and the mechanic arts, and in every department of it taxes the inventive genius of him who pursues it. Armed with knowledge the farmer discovers remedies for the sterility of the soil. And as the skilled and watchful navigator protects and guides his vessel, outriding in safety the fury of the storm, so the intelligent farmer finds means of guarding the fruits of his toil amid vicissitudes that would otherwise render his labor abortive. Bacon has said "Knowl-

edge is power," and many centuries before him Solomon said "Wisdom is strength." The time has gone by when a man can get credit for any thing but ignorance and stupidity who sneers at book-farming. We do not of course advocate that a man should use books instead of brains, but we claim that he must use books in order to make the best possible use of his brains, if he has any, and if he has not it may help him some to get through books the benefit of other people's. Knowledge is power to the farmer as well as to other people. It gives him power to increase his income, power to guide his affairs with discretion, power to lead others onward and upward to better and more successful labor, power to serve his country at the State or national capital, and to guard the interests of the class to which he belongs.

Much, however, as the comfort and also the usefulness of life depends upon the health and vigor of the body, much as the reach of our influence depends upon the culture of the mind, trained and disciplined through the study of the wondrous works of God as seen in the orbs and constellations that shine above, or in the myriad forms of life on earth, in the sea, and in the air, or in the deep caverns beneath, where, amid the silence of ages, the earth's history has been written and preserved; yet to care for the body and train the mind is not the chief mission of the household. Home is the field and youth the opportunity for a still grander work. While you watch the seed time and harvest of earth that there may be bread to the eater and seed to the sower, do not neglect to sow and nurture the seed that is to spring up into a harvest of everlasting life. While you are burdened with the cares and often weary with the toils necessary to obtain the wherewithal to shelter and feed and clothe those dependent upon you, do not neglect the loves and amenities of the fireside for which the young lives around you hunger and thirst as for the bread and water of life. While you rejoice in the possession of well cultivated fields, comfortable and even elegant dwellings, and all the means of rational enjoyment, do not consider these the chief end of life. It has been well, and alas truly said, "there are men who can live only on beefsteak and money bags, the light of whose soul is smothered under the rubbish of sensuality and covetousness, and who have deified mammon upon the throne from which they have discarded the living God. But for us we cannot afford to follow such a delusion. It does not pay well enough when contrasted with the rewards of an unselfish life, a life in which we can appreciate truth and beauty in their outward and visible forms and feel and know the excellences of the unseen through all the types of creation."

RELATION OF LIVE STOCK TO THE FARM.

BY C. L. INGERSOLL.

[Read at Hillsdale and Lansing.]

The great incentive to human improvement in any department of life is profit and comfort. This is especially true of improvement in agriculture, and the question of profit has come in and hindered the advancement when the data upon which that profit was reckoned was incomplete. Many a man has made money on his farm,—speaking after the manner of our farmers,—who has only

been impoverishing his farm to add to his bank account or put more improvements on his farm. He has really made no money; he may have lost. At the best he has only been transferring his property from one form to another, from fertile land into money. The account might be rendered in this form:

Debtor to so many acres of fertile land. Ten years from that time.

Creditor by so much cash and improvements.

Creditor by so many acres of land worth not over half price for farming purposes, and the account will barely balance, in many cases will fall short on the creditor side and need some cash to balance, although some farmers will point approvingly to such a one and say "he has made money." If money or profit is the prime motor in agriculture, let us see how we can best attain our object.

With too many farmers at present it is the all-prevailing idea that they must raise the crop that pays the best, and thus make rapid strides toward wealth. There is, however, one drawback, and that is, that there are so few prophets who are capable of predicting what crop to raise to accomplish that end. Early in the opening up of a country the pioneers must of necessity be restricted in the number of crops they can profitably raise. They require more cultivated land in proportion to the grass land, and consequently less stock is kept in proportion to the arable land than in the older portion of our country. A system of farming is thus inaugurated that takes gradually from the virgin fertility of the soil, and does little to keep up or restore that fertility. After such a system is once begun and practiced for a term of years it is very hard to change the habits and sentiments of such a farmer. The pioneer farmers generally, after a term of years of slipshod farming, give place to others who have to labor to get back a reasonable amount of fertility. The pioneer farmer is generally very wasteful about his manures, and in many parts of our country they have thrown them into streams to be washed away, or drawn them away from their stables simply as a matter of convenience in depositing more, and burned them to get rid of them, almost regarding them as a nuisance. In twenty-five years these same farmers if there, or others occupying their places, would be willing to buy the manure they wasted at good prices.

Their soils are skimmed over and the cream taken off; their crops about one-half what they once were, and they wondering what is the matter. If they know what the matter is, they wonder how they can remedy it. It is a fact patent to all that we cannot take wheat from a granary and still have the same amount there; that we cannot draw constantly on a bank account without depositing and keep our funds good. Neither can we constantly draw on the fertility of the soil and have our farms as productive as at first. The necessity for full and large supplies of manures becomes apparent, and these can only be obtained by the majority of farmers by the keeping of plenty of live stock. They are his first necessity. How mistaken the ideas of the farmer who thinks to make money by selling his hay, his straw, and his corn. How much better to feed them out and have most of the elements left in the manure for use in the growth of succeeding crops, while he gets a return for food consumed in growth, meat, milk, or wool.

In American Agriculture we have not learned the value of manure. In some of the older portions of the United States they are feeling the want severely, and are just looking about for some means of amelioration of their condition. These wants have been felt in the old world, and various means adopted to get back the fertility of their once fertile land. They have saved all their liquid manure, either in tanks or by means of absorbents, and allow no waste. In

some places all manure dropped in vaults, and streets, and roads is carefully husbanded. In France the night-soil of the cities is collected and manufactured into poudrette, the manufacturers putting in a case or earth closet called a tinette. Near Paris they were forced by pure sanitary reasons to get rid of the sewerage, and a large number of acres is now devoted to valuable market gardens that was once a poor sandy waste, and on which nothing grew. The city was glad to give the sewerage away and build large engineering works to carry it to the place of distribution. The increase in acreage is from sixteen acres in 1869 to 314 acres in 1875. The amount distributed in 1874 was 8,000,000 tons, and there was an increase of acreage of 1875 over 1874 of nearly ten per cent., which would give about 9,000,000 tons used in 1875. The profits where this is used are immense. M. Tholomier took some old quarry ground measuring three and one-half acres and paid £6 rental, or about \$28, and received an annual produce that exceeded £160, or about \$800. M. Jolliclere took twenty acres of ground that had been abandoned on account of its barren sandy nature, and from this land has raised twenty tons of carrots per acre: red beets for salad, thirty-five tons; cabbages, thirty tons. M. Boismial raised on such lands in 1874 fifty tons of mangolds and thirty-two bushels of wheat, fifty-six bushels of oats per acre. In China, where such a large population is supported, the utmost care is taken of everything manurial in its nature, and all is carefully used to help hold the fertility of the soil. And it is only by such a rigid, economical saving and use of their manurial agents that they are enabled to support such a population. Many of these circumstances do not surround us in this country and in our vicinities, but we cannot tell how far in the future is the time when we may be in their circumstances, with large cities, large farming population, depleted soils and no more new lands of any value to open up into new farms. Of what use is it for us to read the history of other nations unless we avoid the shoals and breakers on which they have stranded. How much easier for us to keep our soils in a comparative state of fertility than to make them so after they have become sterile and barren by reckless cropping. The comparative few in the neighborhood of cities may succeed in keeping up their lands from the manure obtained in the cities, but the many cannot do in this way, and the best and only true method is to raise stock and be very careful to save all the manure. Each one should keep all the stock he possibly can, not for the direct profit of the stock alone, but for the indirect profit to the farm in the production of manure. In the production of stock we are liable to all the ups and downs of a grain market, but we should be prepared to follow such a system of mixed husbandry as shall give a farmer some cattle, some sheep, some swine, a small quantity of poultry, and as great a variety of grain crops as the seasons and soil of his locality will allow. Then if grains bear a low price he will not be dependent on any one thing for his year's success. The farmer should feed as many of his products on the farm as possible. It is much easier to market 1,000 bushels of corn in beef and pork than to sell and market the grain, and then there is the manure left, which very few farmers take into account in making up their balance sheet on that particular transaction. The value of manure fed to fattening stock is worth from one-third to one-half more than that of animals in ordinary keep.

It may be interesting to know some results of experiment in regard to the feeding of stock, both in regard to the amount of feed consumed and the manure made from it. The experiments,—six in number,—were performed at Woburn Park Farm in England, and by those eminent English experimenters,

Messrs. Lawes and Gilbert. Without giving the full table in all its parts, I will say that the food consumed was oil-cake or corn, clover-hay-chaff and Swedes turnips to the average amount of 531 pounds per head per week; also 133 pounds litter per head per week were used. There would then be a total of 664 pounds food consumed and litter. The manure and litter weighed fresh 575 pounds. The dry substance in this food was 276 pounds; in the manure, 156 pounds; of this there was $106\frac{3}{4}$ pounds dry substance of litter, giving a gain of nearly 50 pounds of dry substance in manure. The summary is this: 276 pounds dry substance of food and litter yield in manure, composed of excrement and litter, 156 pounds, or $56\frac{1}{2}$ per cent of the original amount fed and used; $43\frac{1}{2}$ per cent was therefore used by the animal to lay on flesh and carry on the animal machinery of the system, respiration, etc. These experiments covered a period of eight weeks, and included the feeding of 44 animals of a mean weight of 1,470 pounds.

According to the mean of these experiments there would be required to be fed to produce one ton (2,240 pounds) of manure 168 pounds of cake or corn, 431 pounds clover-hay-chaff, and 1,469 pounds swedes, or 2,068 pounds of food, besides 518 pounds of litter, making a total of 2,586 pounds food and litter. This contained, according to previous estimates, 1,075 pounds of dry substance, and the manure 608 pounds. This shows that more than half of the food and straw used with stock appears in the manure heap, and as farmers generally make no account of this, if they have fed bees or other stock, and reckon their feed and only reckon their cash receipts, they have not taken into account the fact that over 50 per cent of the amount fed is ready to be added to the field to aid in making future crops. Although a little foreign to the subject at this juncture, the result of these experiments in feeding are summed up as follows, other experiments having been performed with sheep and pigs:

1. In proportion to their live weight, sheep consume about $1\frac{1}{4}$ and pigs $2\frac{1}{4}$ times as much dry substance of food as oxen.

2. Oxen should yield about one per cent, sheep about $1\frac{3}{4}$ per cent and pigs 5 or 6 per cent of their weight increase if liberally fed.

3. To produce 1 pound of increase, oxen require 12 to 13 pounds of the dry substance of food, sheep 9 pounds, and pigs 4 to 5 pounds.

I have already referred to the difference in the value of the manure from young and poorly fed animals and those more mature and highly fed. Farmers in the Old World recognize the fact and hence expend large amounts annually for rich and concentrated cattle food, such as rape-cake, oil-cake, and cotton seed cake, both decorticated and undecorticated. They have the benefit of their practical experience and also of the experiments of such men as Dr. J. B. Lawes and Dr. Augustus Voelcker in regard to the money value of food and its residue as manure.

Most persons are aware that the active principles in manure are nitrogen contained in the form of ammonia, or some salt of ammonia, potash in some of its combinations, and phosphoric acid in some combination, probably as phosphate of lime. Prof. Lawes took various kinds of food and from analysis found how much nitrogen, potash, and phosphoric acid they contained in the albuminous compounds and mineral matter as found in the ash. Then after feeding, analyzed the excrements to find the amount of these substances voided. The animals were all carefully weighed and the increase noted. In this way, although having a very complex problem to solve, tabulated statements are made out of the results of several such experiments on cattle, sheep and hogs. The averages

of several will eliminate a large amount of error that might arise from the difference in feeding quality of some animals whose digestive organs seem to be exceptions to the general rule in the working up and assimilation of food. The results of these experiments show that about 90 per cent of all the nitrogen consumed is returned in the manure. Some have found a little more, but this is about the average. Also that practically about all the potash and phosphoric acid is returned. The value of these manures is worked up by taking the market value of these substances as they would have to be purchased in commercial manures.

In the tabulated statement we have the following result in the manure from one ton from each of

	Linseed Cake.	Decorticated Cotton Cake.	Barley Meal.
Ammonia.....	116.3	159.1	38.1
Potash.....	36.4	69.2	12.1
Phosphate of lime.....	104.7	149.	28.7

The money value from one ton of food was respectively, \$22.38, \$31.46, \$7.26. The main point I wish to bring before your minds is this, that in feeding these substances there was very little difference in their feeding qualities. The flesh laid on with these kinds of food did not vary much, if any, in quantity, or, to use the language of Dr. Voelcker, "It will make comparatively little difference so far as the increase in the live weight of the animal is concerned, whether, in addition to a liberal supply of their ordinary bulky food, such as straw and turnips, a ton of linseed cake, or a ton of decorticated or of unde-corticated cotton cake, or a ton of corn be given to fattening oxen or sheep, but the value of the manure resulting from the consumption of a ton of each of these foods will show great differences." With the establishment of such facts as these by good authority, how important that we look to the feeding of our live stock in the production of manure. Other things being considered, it pays the farmer to seek to feed that food that will pay the best results in the value of the manure. Agriculturists are not waking up to this fact as they should. Instead of using the cake of our oil mills at home, and using the cotton cake where the cotton is produced, and the tide of agriculture is at its lowest ebb in this country, we allow English farmers to import this to their own country (I say it to our shame), pay the freight, insurance, duties, etc., and then make a profit on it by feeding it to their stock, not in the greater amount of flesh laid on their animals, but in the greater value of the manure which is returned to their lands. It is a thing to be learned by American farmers that the manure heap is the basis of all success in farming. If he cannot get enough to satisfy the demands of his lands, then resort to crops for green manuring, but in any case let us have the manure, and then crops can be produced. When the crops are produced, then larger amounts of live stock can be kept, and thus more manure produced for future use.

A further relation of live stock to the farm is in the rotation of crops practiced. I am well aware that not one-tenth of the farmers of our State have any fixed rule of action in regard to their crops; that they have no regular rotation; they seem to work about as circumstances waft them, and thus by having variableness in the amount of meadow, pasture, and grain, some are at one

time found with half the stock they might keep well and selling the feed from their farms. At another time they are found with double the amount they ought to keep, and poorly fed. With a steady line of action this would not be so. A farmer should have about an even amount each of certain crops, meadow and pasture, that to be determined by his local circumstances; but he should hold to this idea for future improvement to arrange it, *i. e.*, his rotation, so as to keep the largest amount of stock possible on his farm.

But here will probably arise the great bug-bear of over-production. Many farmers may think that if every other farmer goes to stock-raising the markets will be glutted. There are several reasons why this should not be so, and first of all is the fact that if all should go into this,—which is not at all probable,—it would take some time to raise the supply to such an extent as to overstock our markets; second, as the country grows older, especially our western country, the amount of stock cannot be so materially increased, as with increased population comes the breaking up of immense prairie stock ranges into farms, where grain will be raised, it is true, and fed to the stock, but the numbers will not be so materially increased as many would at first suppose, as the land that raises the grain must be idle during the summer as regards the keeping of stock during that time. With the increased population will come an increased demand for meat and grains. Third, The development of a trade within the last two years (small at present it is true) of butchers' meat, sent in quarters to England and France by means of large refrigerators placed on board ships.

This was begun as an experiment in 1875 and many considered the attempt as unworthy of any considerable thought, but so important has it become that in English papers of Feb. 21, 1876, says our Commissioner of Agriculture, they notice the fact of the arrival of 70 tons of beef in quarters shipped from this country to London, in addition to about 300 tons in January, and the editor adds: "That the possibility of landing dressed beef in a sound and sweet condition has been clearly demonstrated." A later paragraph announces the arrival of 650 quarters or about 60 tons by the White Star line. In France M. Tillier has patented a process of generating cold chemically by means of certain machinery and chemicals, of which one is ether, and a stock company sent their first ship to the La Plata to bring a cargo of beef in April, 1876. This man, by his process, had succeeded in keeping meat at a freezing point 57 days, perfectly sweet and healthful, with a loss of ten per cent in weight.

This matter was brought before prominent agriculturists and stock men in the National Agricultural Congress, held at Philadelphia September 12th, by Mr. Lewis F. Allen, in an address on Live Stock. He says: "That the prices for which this beef has been sold in London and Liverpool have been equal to those paid for the best qualities of their native beef and profitable to the shippers." The idea is advanced, and every thinking man must agree with him in saying that we must send them none but first quality of beef and what will compare favorably with their own finely bred Shorthorns, Galloways, etc., and to do this we must seek to raise a better grade of stock to supply this already rapidly increasing demand. In October, 1876, six steamers of the Anchor line had been provided with refrigerators for this trade, and arrangements had been perfected whereby 200 carcasses per week were to be sent alone to the city of Glasgow, in Scotland. And the prospect is that this trade is but in its infancy. Who may predict what the future may have in store for us? Already we furnish large quantities of grain to Europe. In the not distant future our trade in dressed meats may become fully as important. Then comes in following

this the question of cheap transportation of farm products to market in the shape of meat instead of the raw material.

I do not think that we as farmers need to fear a glutting of markets in our day if we breed and rear improved breeds of stock.

Of course we would not pretend to answer the question as to whether the breeding of horses, cattle, sheep, or swine would pay any particular farmer best, nor would we presume to tell in what proportion his stock should be mixed of the various kinds.

The question has been very ably worked up recently in Great Britain by W. Macdonald, editor of the *North British Agriculturist*, and a long essay with statistics appeared in the *Journal of the Royal Agricultural Society* for 1876, on the relative profits to the farmer from horse, cattle, and sheep breeding, rearing, and feeding in the United Kingdom. The question is not answered, but after comparing the statistics for twenty years and receiving letters from prominent farmers in seventy different localities in regard to it, he makes the following deduction and summary: "Mixed stocks, combining horse breeding, cattle breeding and feeding, and sheep breeding and feeding, unquestionably pay best. Numerous farms are not suited for such a combination; but it is generally admitted that the mixed system referred to is not practiced on nearly so many farms as it could advantageously be. As to sources of profit to the farmer over the country generally, we have, 1st, sheep; 2d, cattle; 3d, horses." But some farmers may be ready to ask if it would not be as well to sell the products of the farm and depend on guano and manufactured superphosphates and other manures. They might do as well for perhaps a very few crops, but would soon find that the manures they have applied, although furnishing the requisite material for enriching the land sufficiently, lacks in supplying the necessary organic substance. We have the conditions of plant growth about as near perfect as possible when we break up our soil at first. The leaf mold gives requisite organic matter, and we find consequently that the largest crops are raised with the least labor (barring the clearing) when we break our virgin soil. So we will always find that the nearer we approach to these primal conditions in enriching the soil, the better will be our success; and large quantities of well-rotted barnyard manure well mingled with straw or litter of any kind will come nearer this than any chemical combination. You will not, I hope, understand me as saying that manufactured manures should not be used; on the contrary, I could wish that every farmer were able to purchase them to some extent as auxiliary to his farm yard products, and thus help to increase the fertility and the production of his farm.

Let us then briefly review the relation we have attempted to portray in this hasty sketch:

1. That early or pioneer farming is a system of prodigality and waste of manurial products, and little live stock is kept, thus giving a gradual depletion of products;

2. That a system of better farming in old countries has followed where the constant effort has been to remedy the first system and gradually bring back the fertility of their lands by saving every kind of manurial substance, as sewage, night soil, and street sweepings, as well as the refuse of many kinds of manufacture, all these being turned to the best account as fertilizers. In a recent paper the fact is stated that a company pays the city of Paris a royalty of \$20,000 per annum for the privilege of sweeping their streets, and that the stock thus taken paid two hundred per cent net by the manufactured manure from the sweepings.

We then deduce from this that live stock bears a prime relation to the farm, and that as agents for the manure they are of the first importance; that the production of the farm will be in direct ratio to the amount of live stock kept for any series of years; that to further this end and keep up the fertility of the farm every farmer should keep all the mixed stock he possibly can; that to do this he should decide upon some rotation suited to the wants of his farm and follow it steadily with this end in view; that he should feed his stock well and with rich food, as the value of his manures depend very much upon that, while the results in the laying on of flesh will be about the same, as proved by experiments; and finally, that we should enrich our soils with manure containing organic matter, as the nearer we approach to the condition in which we found our land, in a state of nature, the greater will be our success; the organic matter having a mechanical effect, as well as merely to enrich the soil.

Let us then mark out a definite line of action, seek to keep more and better stock, and thus labor to increase and retain the fertility of our farms. Let us ever seek to avoid the errors of the past and work for a more glorious future.

WHEAT CULTURE.

BY C. L. INGERSOLL.

[Read at Hillsdale and Ypsilanti Institutes.]

You may be ready to exclaim, "What, another essay on wheat culture! I thought that subject exhausted long ago." Well, my friends, it is something like the temperance question; it is susceptible of many changes. I do not propose to stand and give you a long dissertation on the method of raising wheat, neither do I propose to give or sell you some recipe by which you may all raise on any kind of soil 40 bushels of wheat per acre,—some infallible compound by which farmers may all get rich in a short time. I do not propose to do any thing of the sort, but simply to call your attention for a few minutes to a few facts in connection with grain raising in our own and other countries from which we may possibly draw some inference that may be of value in the present, or at least in the future. It is too true that farmers generally feel, when they have raised and marketed a crop of wheat, as if they had made so much clear money. They too often feel as if this was their main reliance, and if anything should happen to the wheat crop they will be ruined financially. This is not so much so in the States bordering on the Mississippi or lying west of it, where *corn* is king, but in our own State and those lying contiguous this idea is too often supported or encouraged by published statements of the profits of a wheat crop. I quote one example, published in an essay on wheat culture in Rural Affairs, which is but a sample of many: "In those districts which have proved well adapted to wheat raising it has been found one of the most money-making crops, more so before the appearance of the midge than afterwards. George Geddes estimates the following as the cost of an average crop on a good farm, or 20 bushels per acre (although 40 bushels are sometimes raised), with the net profit before the present high prices:

Plowing once.....	\$1 50
Harrowing and rolling.....	50
Drilling.....	31
Seed,—two bushels.....	2 50
Harvesting.....	2 00
Threshing.....	2 50
Total.....	<u>\$9 31</u>
Twenty bushels @ \$1.25.....	\$25 00
Straw.....	2 00
Total.....	<u>\$27 00</u>
Deduct cost.....	9 31
Net profit.....	<u>\$17 69</u>

At present prices this net profit would be much greater. The wheat crop is more liable to uncertainties than corn and oats when all are accompanied with good management; yet with these uncertainties the best farmers obtain as an average at least \$25 net profit yearly in payment for interest on land, taxes, and for superintendence."

You will pardon me for quoting this at length, but the idea is carried that farmers may make these amounts net without very much outlay and trouble, especially if they are good farmers, and who would want to acknowledge that he was a poor farmer?

Would he not rather attribute his want of success to almost anything else beside his being a poor farmer? The poor soil, bad luck, the inclement season, the insects, all will receive a share of the blame. Why? because many agricultural writers tell us there is no trouble, or at least very little, in raising remunerative crops of winter wheat if we follow the right course—if we are only good farmers.

The time was in this State, and I have no doubt some present may remember it, when winter wheat was about as sure a crop as could be sown or raised. In the earlier history of our State thirty to forty bushels per acre for the first five or six years, and sometimes ten after the field was cleared was no uncommon yield. Go to the men occupying those same farms to-day and ask them how it is. You may find the farms occupied by better farmers than the pioneers. The result will be answers ranging from fifteen to twenty-five bushels.

The truth is about this: the first fertility of the soil has been cropped away by too great a succession of grain crops. Then there comes in the greater severity of our winters, which affects some localities, and is constantly growing worse. The insect enemies, too, come in for their share. All these and many other considerations are constantly working toward the diminution of the amount per acre. In looking at the statistics of wheat culture in our own State, I find the following facts: Taking the amount raised per acre as per Department of Agriculture report since its establishment in 1862, I find the greatest amount eighteen bushels per acre average in Michigan. This was in 1862. The smallest yield per acre twelve bushels in 1864. This was the memorable year when the ice killed wheat so extensively in some localities; and also in 1872 we have the same yield. If we group this period of thirteen years into four shorter

periods, giving three years in each of three periods and four years in the last, we shall have the following averages, viz.: $14\frac{1}{2}$, 13.9, 13.7, and 13.1 bushels, showing a gradual diminution. Make these periods four years and the last five on account of the uneven number thirteen, and we have $14\frac{2}{3}$, $13\frac{1}{2}$, and 13.28 bushels, showing still a gradual decrease with a new grouping. Divide again into periods respectively of six and seven years and we have an average of 14.14 and 13.4 bushels per acre. Thus you will see that there is a real and gradual diminution in the yield of wheat per acre in our State, and that this is no fictitious manipulating of figures to produce a given result: but the average falls lower, group these thirteen years in whatever way you please.

This being the true state of affairs in our own State to-day, with the fact confronting us that there is annually a large acreage cleared and put into wheat, which brings a large yield for the first three crops, and what conclusion are we to draw for the future when there will be very few, if any, new fields to open up to this crop. There will be only this conclusion, that our yearly average per acre will be very much lessened. Another fact has a bearing just here, and that is this: that the farmers in the older portions of our State are waking up as it were to the exigencies of the case, and for the last ten years have been improving their methods of farming in such a way as to assist in keeping up this average.

The uncertainty of the wheat crop. The opinion is rapidly gaining ground among farmers that the wheat crop is an uncertain crop, and when we compare it with almost any other of our staple crops, we see that this is largely the case.

If the farmer sows a little too early he is liable to give his crop to the insect, especially if frosts are late and the weather warm in the fall. Then if he sow late there is danger of the wheat getting a small root and top, or a "poor start," as farmers generally term it, and then is less able to withstand the rigors of our winters if we have little snow for protection.

If the crop pass all these in safety, we sometimes have a drouth in the latter part of March or first part of April that, with the high winds usually prevailing, gives it a severe trial. Then later in the season the danger of midge and rust, together with the anxiety of good weather in harvest, puts the wheat crop among those that are liable to the greatest number of casualties.

You will notice that the season, or some of its conditions, has very much to do with the success of a wheat crop after the farmer has done his duty fully and even kept his land in a condition of fertility capable of producing thirty bushels per acre. The meteorology of the country has much to do with our crop, and although it has been but six years since the first attempts at prediction of storms and their areas, and many mistakes and blunders have occurred, we have in the report given by General Meyer, that during 1876 eighty-seven per cent. of the predictions were verified in every particular. If this be the record of what has been done in six years, may we not hope as observations are multiplied and extended over a series of years, that inductions may be made as to the general character of a whole season so as to aid the agriculturist much more than at present. Already many millions have been saved in the greater value of crops secured by the prediction of local or general storms from 24 to 48 hours before they came.

GENERAL ESTIMATES.

Although there is a general decline in the amount per acre, are we not approaching a wheat scarcity? In an address before the National Agricultural

Congress by the Statistician of the Department of Agriculture we find the following estimate of wheat raised in proportion to the population: In 1849 there were 4.3 bushels per capita; in 1859, 5.5 bushels; and in 1869, 7.46 bushels. This shows an increase of more than 50 per cent in proportion to population in 20 years. This fact is reached by statistics, viz.: that we are in more danger of over production than the other extreme as long as we have large areas brought under the plow for the first time each year. Mr. Dodge adds further: "We learn from statistics that grain-growing exclusively, though remunerative as a temporary expedient, is a speculation and not true farming." Farmers have simply exchanged the fertility of their farms for the improvements put upon them, and the money they have and suppose they have made.

Let us glance for a moment at the statistics of wheat culture in some parts of Europe. Taking the six countries that stand highest in the amounts raised per acre, we have, first, Great Britain, $27\frac{1}{2}$ bushels per acre; Netherlands, $25\frac{1}{4}$; Belgium, $20\frac{3}{4}$; Norway, $12\frac{3}{4}$; and Spain, $11\frac{1}{2}$. Don Perruelas, a member of the Spanish Cortes, in writing of this deplures the exhaustive system of grain-growing in Spain, and strongly urges the necessity of agricultural schools to teach the people, and particularly the young, the necessity of economizing and husbanding the fertility of the soil. If we place Michigan in this comparison we find that with her average in 1874 of 14.2 bushels she would stand fifth in rank. If we compare the United States as a whole, we find that we should rank sixth, or next to poor down-trodden Spain. When we compare the amount with that in England, we find that they nearly or quite exceed us by 100 per cent as a State, and even more as United States. When we compare the yield per acre for several years back in Great Britain we find that there has been a gradual increase,—that a high system of farming, with particular care to have a fixed rotation in which wheat shall occur not more than once in four years, and more often but once in seven or eight years, has had much to do with this. The system of crops between is such as to give back the greatest amount of fertilizing material to the soil. In addition to all this we find them frequently sowing largely of some fertilizer to help to grow a large crop on a few acres. It seems to me that we as American farmers should not be slow to learn that in cultivation of a fewer number of acres and cultivating them better we shall be largely the gainers. We should learn, I think, to keep as large a portion of our farms in grass and forage crops as possible, for land in grass will recuperate more or less according to the circumstances, the amount of stock kept on the farm having something to do with it. The simple fact of having the soil covered by vegetation,—a thick coat of grass, if not fed off,—acts as a charm, on light soils particularly. But, some one may ask, can we not raise several successive crops of wheat and still retain the fertility of our soils by just knowing what kind of dressing to apply and the amount? I can best answer this question by giving the summary of a series of experiments carried on for a period of six years at Rodmersham to confirm the results of another series at Rothamstead. The seven plats received per acre:

1. No manure, the land in high condition.
2. Mixed mineral manure, 300 lbs. sulph. potash, 200 lbs. sulph. soda, 100 sulph. mag., 200 bone ash, 150 H_2 , $S O_4$.
3. 200 sulph. am., 200 chl. am.
4. Nos. 2 and 3 combined (best results).
5. 540 pounds Peruvian guano.
6. 2,000 rape cake.
7. 14 tons farmyard manure.

After giving the results and speaking of the state of the soil before the experiment, and the conditions that led to the results this deduction is made: "It is not to be concluded from this, however, that the farmer may with impunity grow large white-straw crops by means of artificial manures without a due supply of farmyard manure to the land at some period of the rotation."

The results showed that of the manures applied, the amount of nitrogen returned in the crops of six years was only about forty per cent of the amount applied during the four years of the manurial application even with the best crops. Lawes and Gilbert farther state that by the use of such mineral manure a farmer may, if he has applied a liberal amount of manure during the rotation, take an extra grain crop by using one and one-half times or twice as much artificial manure as when the crop is grown in the regular rotation. There are others who give concurrent testimony. Mr. Archibald Smith Maxwell in an article on portable manures and their home manufacture says, "It is absurd to suppose that these alone can keep the land at all times in good heart; they ought rather to be employed as stimulants or auxiliaries than as a complete substitute for farmyard manure." That our soils need something beside the ordinary chemical elements to keep up their fertility, is getting to be an established fact. But in France it was once supposed that Flemish manure, or night-soil, would do this without the application of coarser substances. The Agricultural Society of Lille appointed a committee to answer certain questions in regard to this fertilizing agent. In answer to their first question, "Can Flemish manure be used exclusively?" they say, "There can be no progressive agriculture without stock, and consequently without straw manure. * * *

From the results of direct experiments we are convinced that employed alone it tends to give a solidity to the soil which repeated plowings would fail to remove." One farm is mentioned in this district of Lille where but two cows were kept on one hundred acres of land, and Flemish manure used almost exclusively. It soon became evident that the corn ran to leaf. The stems did not develop properly, and the yield was deficient. Upon changing the system and introducing plenty of stock on the farm, and using their manure, the crops soon became equal to any in the district.

They conclude that such strong and concentrated manures are much better adapted to light soils than heavy, and that all soils need some straw or coarse manure with animal excrements to keep a proper porosity of the soil.

You are almost ready to infer from what I have said that I would hardly advocate wheat culture to any great extent. Not so; but I would recommend to sow a less number of acres, and instead of making wheat the prime crop, only cultivate it as a means to the filling up of a rotation, and as a crop to seed to grass after. Although farmers do not as a mass so consider it, grass is their main dependence, and instead of grain being king, grass is the real king. Farmers should have the grass in their rotation the most important desideratum, and raise the other crops not merely as a means to get so many dollars profit by their sale, but labor to keep up the fertility of their farms. In order to do this a crop of wheat should not be taken from a field more than once in four years, and it would be better if it could not be done more than once in six years. Some of our best farmers are advocating and adopting the system of taking oats or barley before a crop of wheat, and the time was when wheat was largely sown after corn in Michigan, but we are glad to say is now nearly abandoned.

As to the crop of oats or barley, if we consider them as the main crop, and the wheat merely as a crop to fill up time and as excellent to seed, after we have

taken about the right view, we can, in the necessary plowing, cultivating, and harrowing to kill the shelled oats or barley, do nearly as much labor as on the old system of open fallow, have our summer crop keep down the weeds, and usually get from three-quarters to seven-eighths as large a crop of wheat as by the old process.

One other point in wheat culture presents itself, and that is the matter of seed. Our farmers are too careless about this.

If as much pains were taken to pedigree our wheat as it were, and ascertain how it had been raised for several years, much good would be done. Almost any farmer can improve his wheat by taking the earliest, largest and finest heads for two or three years and sowing their produce.

To any who may be a little skeptical on this point, let me refer you to a paper on the pedigree of wheat as a means of increasing the crop, by Frederic F. Hallet. This appeared in the Journal of the Royal Agricultural Society of Great Britain. He claims that with due attention to the seed we may seed with less and have the tillering propensity of the plant largely increased, with the ears much lengthened, and the number of grains in the ear increased. I reproduce his table, showing his experiment and the result:

	Length.	Grains.	No. of ears on stool.
1857—Original ear.....	4 $\frac{3}{8}$ in.	47	-----
1858—Finest ear raised.....	6 $\frac{1}{4}$ "	79	10
1859— " ".....	7 $\frac{1}{4}$ "	91	22
1860—Ears imperfect from wet season.....			39
1861—Finest ear.....	8 $\frac{3}{4}$ "	123	52

Thus you see that by repeated selections alone the length of ear has been doubled, the number of grains nearly trebled, and the tillering power of the seed increased nearly five fold. By taking large ears to start with found them developed into coarse products that were not very salable, so he took an ear with a fine quality of grain, irrespective of the size of the ear, and trusted to pedigree and selection to obtain fine ears. In planting the grains of a single ear one was always found to greatly excel all others in vital power, but planting them in the order in which they grew on the ear, no fixed place was found for this grain having this strong vital power. In order to determine whether such pedigree would produce as much with thin seeding, he sowed two plats of an acre each, six pecks being drilled on the first and 4 $\frac{1}{2}$ pints planted in single grains one foot apart each way on the second. It was found the wheat that was planted produced over 67,000 more ears on an acre than the drilled, and about 21 times the amount of seed was used in drilling. After obtaining ten pecks of seed he was anxious to try and did sow ten acres at the rate of one peck per acre, getting it in very late. Notwithstanding this fact he harvested 57 bushels of wheat per acre, and a growth of straw weighing 2 $\frac{1}{4}$ tons per acre.

In giving you these results I do not expect that we in our climate and with our prices for labor could attain such a result, but I do think that much may be done in the furtherance of this object by our farmers by attention to the matter of seed and sowing only the finest. Michigan was once nearly first among the wheat-producing States, but has now taken several steps down the ladder. Shall not we take up this matter, and by educating ourselves raise a

less number of acres and more bushels on each acre? May we all learn that true independence and wealth consists not in a large amount of any single crop, but in having a medium amount of a large variety of crops.

Time speed the hour when we may point with pride to an increasing ratio of production of our cereals, and our beloved peninsular State be second to none in the quality of these productions.

BREEDING AND FEEDING HOGS.

BY MR. FRANK GULLEY, OF DEARBORN.

[Read at the Ypsilanti Institute.]

It has become a well established fact that in Michigan what is known as mixed husbandry is generally more profitable than any one specialty. There are men who have become wealthy from raising one particular crop, but the great mass of farmers sooner or later will find it to their pecuniary interest to produce several commodities for sale, either beef, pork, or mutton, or some of the different grains, vegetables, or fruits. We have not the rich prairie lands of some of the western States, that will grow paying crops of wheat or corn for years in succession, and we must therefore include in *our crops* the breeding and feeding of some of the domestic animals, not only for the purpose of converting our rough feed into meat, wool, or milk, to be turned into money, but also to furnish manure to keep up and increase the fertility of our soil.

Without further introduction I wish to call your attention to the merits of the pig, believing the growing of pork, *in connection with other farm productions*, can be made profitable by good farmers in almost any portion of our State. Many have an idea that we cannot compete with the great corn-producing States in the growing of pork, but it seems to be the natural order of things in agriculture that when we undertake to carry any one specialty beyond a certain limit something arises that eventually makes the losses more than balance profits, as, for instance, the men who are engaged exclusively in fruit meet with embarrassing losses, by cold winters, hot summers, blight, insects,—last year by an over-production. The tendency is to dissuade men from going into fruit exclusively, and to make it one of several crops. The same is true in regard to raising grain, cattle, sheep, or hogs. The western farmers who have formerly raised hogs by the hundreds and thousands, are obliged, through fear of heavy losses by the cholera, to reduce their herds and direct a portion of their labor in some other channel. This, with the enormous demand for exportation, promises more stability in the price of pork than in almost any other agricultural product. While our western brother farmers have our sincere sympathy for their misfortune in not being able to keep up their immense herds of swine, yet we are inclined to look upon the bright side of the picture and not murmur at the inscrutable will of a Divine Providence whereby the price of pork is raised two or three cents per pound, enabling us in our State to fatten a few pigs with as much or more profit than any thing else we raise.

We are often asked which is the best breed of pigs. I wish to say right here that we make it a part of our business to breed and sell thoroughbred Essex

swine; you may therefore infer that this breed has our preference, but please remember I extol this breed above others. It is the beaten track which breeders generally follow in claiming greater perfection in their favorite stock than in almost any thing else in either heaven or earth. I dare say if I were to claim that any one breed of swine is better than all others I would be confronted by an appalling array of weight and ages, amount of food consumed, and asked for proofs. Therefore I will not say there is a best breed.

We have in this country three prominent established breeds of swine that originated in the old country, and whose characteristics have become fixed by having been bred in the same line for years. I refer to the Suffolks, Essex, and Berkshires. There are some other breeds, but these three stand out prominent as the Shorthorns, Devons and one or two other breeds of cattle. There are also several breeds or families of swine that originated in this country, as the Poland Chinas, Chester Whites, etc. The question for us to study is which breed, if any, will prove the most *profitable* for us to keep. Let us for a few minutes look at the characteristics of the breeds we have spoken of. It has been the aim of the breeders of the Suffolks, Essex, and Berkshires for years to reduce the coarse parts, as the head, legs, intestines, etc., to the smallest amount possible and to increase the tendency to lay on fat and mature early. The effect has been to reduce the size and weaken the constitution of the original hog. Many farmers who have invested in these breeds have not found them so profitable as they had been led to expect, as they will not thrive under the same treatment as the common hog, and are not so productive. They also claim they do not grow large enough and are liable to break down while being fattened.

The originators and breeders of the Poland Chinas and Chester Whites claim to have produced breeds that grow to larger size, are hardier, more productive, and still retain the fattening qualities of the three breeds first spoken of. The Chester Whites are losing their popularity, and it is a common thing to hear men condemn this breed. The Poland Chinas are a popular breed both in this State and at the west. They are claimed by the growers to be superior to all other breeds, to have a stronger constitution, to be better breeders and milkers, bones strong enough to carry all the weight that can be put upon them, hardier, attain greater size, and still have the quiet disposition and easy fattening qualities of the three breeds first spoken of. To be a good breeder the female must have a strong roomy frame, well developed and large reproductive organs, and to be a good milker must have a hearty appetite and powerful digestive apparatus. The Poland Chinas as a class undoubtedly possess these qualifications to a greater extent than the three breeds spoken of first. They have stronger bones, grow to a larger size; the sows have larger and stronger litters, but are they the most profitable pig for us to raise? I have seen fine specimens of this breed, and some that were exceedingly coarse.

A gentleman called on me last spring and asked me if I did not want to buy a good Poland China boar. I inquired the age and size, and was told he was about a year old, and would probably weigh 400 or 500 pounds. Said I, "Is he larger than that pig?" pointing to an Essex in the yard that would weigh about 300 pounds. Said he, "Bless you, one of his ears would cover that pig." I told him I didn't care to purchase.

At an Institute held last winter a gentleman said it should be the aim of farmers to combine the excellencies of all the different breeds of cattle in one. Is this possible? We have the Shorthorns for beef, the Ayreshires for milk, and Jerseys for butter. We can produce an animal that will fatten readily, be a

good milker and butter maker, but it will not possess the superior excellence in each department of the three breeds; nor will it be able to transmit these excellencies to its offspring.

We may compare the fine breeds of pigs to the Shorthorn cattle, as it is the aim of the breeders in each to produce animals that will mature early, fatten easily, make meat, *and transmit these characteristics to the offspring*, and nothing else. If we visit the finest herds of Shorthorns, we find the cows indifferent milkers. Common cows are kept to furnish milk for the calves, and the animals receive more care and attention than many members of the human family. The cows are neither good breeders nor milkers. The owners are often disappointed by their finest heifers proving barren. All other qualifications have been sacrificed to produce meat.

If the cows were to receive the treatment of a large portion of our common cows,—a rail fence for shelter in the winter, a straw stack to feed on, and allowed to drop their calves when and where they pleased, there would be few calves raised, and they would be worthless. We may have a machine that will be perfect, as a grain thresher and separator, but the same adjustment will not thresh clover. Neither can we produce an animal that cannot be excelled as an early maturing meat producer, with the power to transmit these qualities, and still not be surpassed as a breeder and milker.

In reducing the coarse parts to produce the fine-boned pigs, the organs of reproduction have been reduced with the rest, and the sow cannot produce and raise a litter of pigs as successfully as a coarser animal.

While butchering I have often noticed the difference in opening the common sows and the thoroughbreds or high grades. The first with large paunchy stomach, covered with a thin layer of meat an inch or two thick, and intestines sufficient to fill a bushel basket, while the others would be as round and straight as a Shorthorn steer, with four or five inches of solid meat, and intestines hardly sufficient to fill a common pail. Can the one produce as many or as strong pigs as the other or feed them afterwards?

Wherein does the value of these pigs lie? The object of fine bred swine is to produce males with certain desirable qualities so firmly fixed in them that when they are bred on common or grade sows the offspring will inherit the desirable qualities of the sire. The object in using the common or grade sow, instead of the thoroughbred, is to get an animal that will produce larger and stronger litters, furnish more milk, while the offspring will inherit the early maturing, easy fattening disposition of the sire, combined with the vigorous appetite and harder constitution of the dam.

If a man were to purchase a high-priced Shorthorn bull and Duchess cows merely to raise beef, we would consider him crazy; but if he should procure some good common or grade cows we would consider him on the road to success. If I were about to commence a herd of swine merely to raise pork, I would purchase a fine bred boar from some responsible breeder and some good ordinary sows to use him on. From the pigs thus produced I would select my breeding sows, not taking the shortest nosed, finest boned pigs, but rather selecting those with long bodies and strong, roomy frame, expecting the sire to transmit his characteristics on the young. On these half-bred sows I would use another boar of the same kind as their sire, but not related to him.

There are several breeders of Shorthorns present, and I believe they will agree with me when I say we can put a pound of flesh on a high grade as cheaply as on a thoroughbred. It certainly does not cost so much to raise the grade, as

there is not so much capital invested in the dam. Some of the finest pigs we have ever raised have been grades.

There may be men present who are having good success in breeding from one, or two, or three fine bred sows, and find that they can raise pork profitably, but they are obliged to give them the best of care, and even then, if they increase their herd, they will find that some of their sows will prove barren, or will have small litters, will lose their pigs, and other troubles that do not ordinarily affect coarser sows.

This is not mere theory, nor have we come to these conclusions from keeping two or three pigs and read up the matter. We have tested it in the practical way, to get at the value of almost everything—weighed it in the balance against dollars and cents. We have for several years kept from fifty to two hundred pigs, principally to furnish manure for gardening, and being obliged to buy a large portion of our feed, have given the matter considerable study. We are satisfied from experience that we cannot make the common hog profitable, while the improved pig does pay. I am also well satisfied that breeding thoroughbred pigs is a business of itself, requiring the same care and judgment that it does to grow the fine breeds of cattle or horses. The ordinary farmer will not find it profitable to raise pork from the fine thoroughbred sows, but he cannot afford to be without the pure bred males to use on his common or grade swine. A farmer who has never fed any but the coarse common hog will be astonished at the improvement that is made by crossing a fine boar on his common stock.

MISCELLANEOUS PAPERS.

TURNPIKING AND UNDERDRAINING COMMON ROADS.

BY R. C. CARPENTER, C. E., MICH. STATE AGRICULTURAL COLLEGE.

In this article it is proposed to briefly discuss the various methods of providing an escape of the surplus water from roads. The methods recommended here are valuable only when applied as here designated. It is not claimed that the removal of the water will, in all circumstances and under all conditions, render a road good; but it is claimed that this is an essential condition to the making of a good road, and one which if not provided by nature must be provided artificially.

The systems of turnpiking and underdraining are fully considered, but metalling, that is applying a road covering, as gravel or broken stone, though strongly recommended, is not treated of in this article.

IMPORTANCE OF ROAD DRAINAGE.

The principal cause of poor roads on all heavy soils is an over-abundance of water, which renders the road wet, soft, and at times totally unfit for travel; consequently we find that the road makers in all ages have strongly urged the adoption of some efficient method of removing the surplus water. For instance, McAdam, in his report to the British Board of Agriculture (Vol. VI., p. 46) says, "Roads can never be rendered perfectly secure until the following principles be fully understood, admitted, and acted upon, namely: that it is the native soil which really supports the weight of traffic; that while it is preserved in a dry state it will carry any weight without sinking, and that it does, in fact, carry the road and carriages also; that this *native soil must previously be made quite dry*, and a covering impenetrable to rain must then be placed over it, to preserve it in that dry state; that the thickness of a road should only be regulated by the quantity of material necessary to form such impervious covering, and never by any reference to its own power of carrying weight. There are some exceptions to this rule. A road of good naturally binding gravel may be laid on a sub-bed of bog-earth, which from its tenacity will carry all kinds of carriages for many years."

DIRECTIONS FOR PREPARING MACADAMIZED ROAD.

Mr. McAdam in describing the method of preparing a road-bed says: "The first operation in making a road should be the reverse of digging a trench. The road should not be sunk below, but rather raised above the ordinary level of the adjacent ground; care should be taken at any rate that there be a sufficient fall to take off the water, so that it should always be some inches below the level

of the ground upon which the road is intended to be placed; this must be done either by making drains to lower the level of the water, or if that be not practicable from the nature of the country, then the soil upon which the road is proposed to be laid must be raised by embanking so as to be some inches above the level of the water. *Having secured the soil from under water*, the road-maker is next to secure it from rain water by a solid road made of clean, dry broken stone or flint (none of the fragments of which to be greater than two inches in diameter), so selected, prepared, and laid as to be impervious to water; and this cannot be effected unless the greatest care be taken that no earth, clay, chalk, or other matter that will hold or conduct water be mixed with the stone, which must be so prepared and laid as to unite with its own angles into a firm, compact, impenetrable body."

Another practical road-maker, Mr. Patterson of Montrose, of the same age as Mr. McAdam, commends the principles proposed by Mr. McAdam, but objects, as we think with reason, to his drainage of three or four inches as being insufficient.

TELFORD ROADS.

Again Telford, whose roads to-day are the best that England possesses, laid great stress in all his *practical* operations upon thorough and complete drainage. His roads are made of layers of broken stone resting upon a sub-pavement of stone blocks. Telford's specifications for a roadway of 30 feet were as follows: "Upon the level bed prepared for the road materials a *bottom course or layer of stones* is to be set by hand in the form of a close, firm pavement. The stones set in the middle of the road are to be seven inches in depth; at nine feet from the center, five inches; at twelve from the center, four inches; and at fifteen from the center, three inches. They are to be set on their *broadest edges and lengthwise across the road*, and the breadth of the upper edge is not to exceed four inches in any case. All the irregularities of the upper part of the said pavement are to be broken off by the hammer, and all the interstices to be filled with stone chips, *firmly wedged or packed by hand* with a light hammer, so that when the whole pavement is finished there shall be a convexity of four inches in the breadth of fifteen feet from the center. This pavement is to be coated with stone broken as nearly as possible into cubical pieces, whose edges must not exceed $2\frac{1}{2}$ inches in length, and which must be applied in layers over the remainder of the pavement so as to make the whole convexity of the road six inches from the center to the sides of it, the whole to be covered with a depth of one inch and one-half of good clean gravel.

"The advantages of this system are most striking when the natural soil is retentive of moisture, as where it is clay the pavement then acts as an under-drain to carry off the water which may find its way through the broken stone surface. Even on a rock this pavement may be laid with advantage to form a dry floor."

WALKER'S SYSTEM.

A dry foundation and clearing the road from water are two important objects which, according to Walker (minutes of evidence before a committee of the House of Commons, 1819), ought to be kept in view in laying out roads. "For obtaining the first of these objects it is essential that the line for the road be taken so that the foundation can be kept dry, either by avoiding low ground, by raising the surface of the road above the level of the ground on each side of it, or by drawing off the water by means of side drains. The other object, viz.,

that of clearing a road of water, is best secured by selecting a course for the road which is not horizontally level, so that the surface of the road may in its longitudinal section form in some degree an inclined plane; and when this cannot be obtained, owing to the extreme flatness of the country, an artificial inclination may generally be made. When a road is so formed, every wheel-track that is made being in the line of the inclination, becomes a channel for carrying off the water much more effectively than can be done by a curvature of the road without the danger or other disadvantages which necessarily attend the rounding of the road much in the middle. Walker considered a fall of about one inch and a half in ten feet to be about a minimum in this case, if it is attainable without a great deal of expense."

It may be remarked concerning the theory proposed by Walker for surface drainage, that though it might effectually secure that object, it would, if the road be too steep, not only increase the draught of vehicles passing over, but the surface would suffer greatly from being washed. For instance, the minimum inclination allowed by him of one and one-half inch in ten feet, or of one foot in eighty, would give a velocity to the water flowing down of about one foot per second, provided the water is one-eighth of an inch in depth, which would be sufficient to move fine gravel, and consequently injure the surface very much, while a greater inclination would affect it much worse. Although the grade proposed is lighter than many that are retained on good roads, still when the choice lies between level roads and roads of this inclination, level roads are always to be preferred, since the draught over them is one-eightieth lighter than over roads having this inclination, and other methods equally effectual can be found of removing the surface water.

The methods previously described of constructing roads as prescribed by McAdam and Telford have been adopted and carried out to a great extent in making the roads in Great Britain and in some portions of this country. Long and constant use has demonstrated that the principles promulgated by McAdam are sound and reliable only to a certain extent. It is to be noticed further that in McAdam's directions for preparing a road-bed he makes slight provision for drainage, a condition which he admits to be of much importance when stating the principles on which he thinks the construction of good roads depends; Telford, on the other hand, though saying very little about the *great* importance of drainage, makes thorough provision for it by his pavement of large stone, through which the water passes as though it were a sieve, leaving the road high and dry. Again, it is very much to be doubted that a road covering entirely impervious to water can be formed as McAdam in his directions indicates. McAdam gives one or two instances where the road covering has preserved the road-bed beneath perfectly dry. But from some statements he makes regarding the comparative merits of the roads constructed by him and by his rival Telford, we must conclude that he changed his mind respecting the power of broken stone to resist the permeating force of water. Telford prepares a different foundation, but uses a road covering in every essential the same as that proposed by McAdam. Yet of these roads McAdam says the water passes through as readily as through a sieve, a statement entirely incompatible with the one "that a broken stone road is impermeable to water." Although no road covering is entirely impenetrable to water, yet a good compact covering of either broken stone or gravel, properly rounded in the center, will convey a very large per centage of the water that falls upon it to the sides of the road, while a flat surface of either broken stone or gravel will soon absorb water and become

soft and muddy. The Telford roads are much better than the McAdam roads, especially where the McAdam roads have been built over low ground with no more provision for drainage than given in the original directions of McAdam, simply because Telford prescribes a better drainage for the road foundation in his directions.

Thus it is seen that thorough drainage of roads has always been and still is of great importance in road construction, and, second, that the best road coverings cannot be made entirely impervious to water.

METHODS OF DRAINING ROADS.

The next questions that naturally arise are regarding the methods of draining roads. The methods of the great English road builders have been fully stated, but on account of the great cost of these roads, for the time being at least, we will have to content ourselves with cheaper roads. Whatever system of road making is adopted, it should be one that will keep our roads constantly improving, and one that does not demand very costly annual improvements to keep them steadily growing better. It is a well known fact that if means are provided for the escape of water, even though no broken stone, gravel, or other road covering be applied, the road will be greatly improved. A dry, smooth road on clay or loam (roads on dry sand not referred to in this article) is always in a good condition, and the nearer dry a road on heavy soil can be kept the better will it be. The common means resorted to for removing the water is by turnpiking, ditching, and by under-draining. These three methods we will consider somewhat in detail.

TURNPIKING

is performed by excavating ditches at the sides of the road and throwing the earth obtained from these into the center, forming an elevated ridge on which the roadway is formed. The roadway being elevated above the side channels the water passes from it partly by passing through the surface of the road and working its way through the ground until it reaches the side channels, and partly by running directly down the slopes of the roadway into the side channels. The efficiency of the turnpike depends upon its dryness; for when heavy soils are saturated with water they become soft and incapable of supporting a heavy load, consequently it becomes evident that the surface of the turnpike should be made of such shape as to allow as little water as possible to permeate the surface, and it should convey as large a per cent as the conditions will allow directly to the side channels, which should be made so as to convey the water that passes into them completely and rapidly away.

SLOPE OF THE ROADWAY.

The slope that may be given the surface depends somewhat upon the nature of the soil and the character of the travel that passes over the road.

The steeper the surface the less water will it absorb, but if it be made too steep, the water passing over it will wash much earth into the side channels thus rendering them comparatively useless as well as endangering the safety of the travelers who drive near the side of the road. The exact slope that will best suit all cases cannot definitely be stated, but experience has shown that a rise of one inch for every three feet measured horizontally answers the required conditions very well for the road bed. The slope of the side of the road to the ditches should be little more than one inch to the foot, while a steeper slope,

for instance one that rises four inches per foot horizontally, will do for the side of the ditches next the road side fences, as they are less likely to be cut or trampled out of shape by passing vehicles. The usual practice in turnpiking is

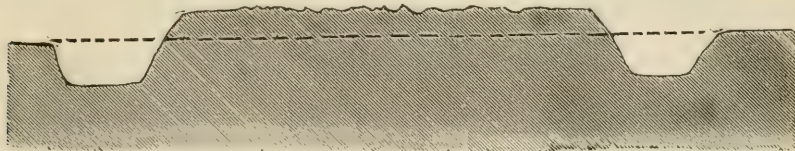


FIG. 1.

to make a road with the side slopes and cross section as shown in Fig. 1, the objections to which are evident and may be concisely stated as follows: The side ditches have steep sides, their deepest portions are next the roadway, the road is narrow,—travel is kept in one place,—it is difficult and often dangerous to turn out; the road soon becomes rough and rutted, and bears deep mud holes on its upper surface, as scarcely any water can reach the side channels without first passing through the soil of the roadway itself.

The side of the roadway should be sloped from the center, gradually increasing in steepness to the bottom of the ditches, so as to give the water the greatest rapidity, where its washing will do the least hurt. Practically it will answer every purpose to make the sides of the ditches uniformly ascending planes, which are curved to meet each other after reaching the road bed. Fig. 2 shows the proper form of a turnpiked road; the dotted line marks the position of the original surface of the land, the portion above the dotted line the *roadway*, the light portion below the dotted line the *side ditches*, which have been excavated in forming the roadway.

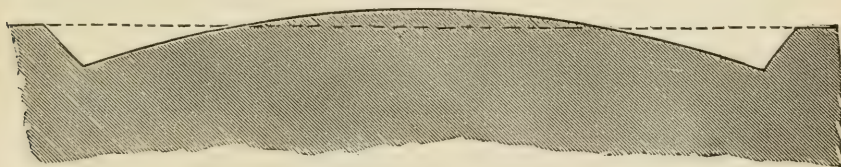


FIG. 2.

The width of the roadway (that portion above the dotted line in Fig. 2) should be made to depend upon the amount and character of the travel that passes over the road. A roadway of twenty-five feet in width will probably accommodate any traffic that passes over or may be expected to pass over any country road in this State. It is doubtful economy to construct a roadway less than sixteen feet under any circumstances, while a roadway of twenty feet will probably answer well for all roads except such as have an exceptionally large traffic over them. A roadway of twenty feet will afford ample room for two teams to meet, even when loaded with unusually wide and bulky articles, as for instance with hay, for wagons are usually less than five feet wide, and racks do not project over four feet on each side, making the total width thirteen feet; if the outer wheel of each wagon be driven on the edge of the roadbed the rack will project four feet over the slope of the ditch and there will be a clear space of two feet between the racks. Even if they drove down on the side there would be little or no danger of tipping over. The *ditches* or *side channels* should have a concave surface; cut No. 3 shows a desirable form of cross-sections; cut No. 4 shows the ordinary undesirable form.

They also should have a continuous ascent from the outlet to the highest portion of the road, and the outlets provided should be of sufficient size to allow all water that passes down the side channels to pass through at once into water-courses or suitable reservoirs, where its presence will not affect the road.

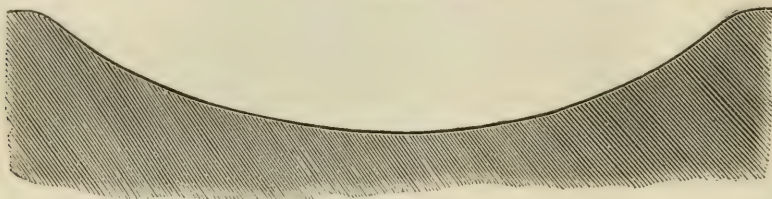


FIG. 3.

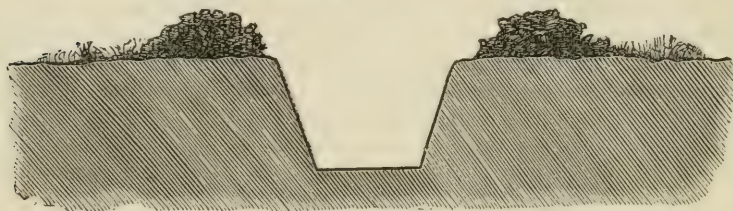


FIG. 4.

The depressions that occur on the line of almost every road, mark the position of ravines or water courses that make an angle with the axis of the road, and which afford excellent means of emptying the side channels.

On roads over flat, low or marshy grounds, it is of vital importance to the condition of the road that the side channels be provided with ample means of allowing the water to escape.

To prepare these outlets in such cases, will often need long line of ditches which empty some distance from the road, and can be prepared only at great expense. Where low or marshy lands cannot be ditched and the road cannot be turned so as to avoid them, it is doubtful if a permanent road can be built; but a very good road can be built by laying parallel to the axis of the road three logs as nearly as possible of the same diameter. On these lay cross logs of uniform diameter and not less than sixteen feet long. Then fill in the interstices of these cross logs with poles from one to three inches in diameter, on top of which lay a layer of fascines (brushwood bound in bundles with withes) six inches deep. Cover the whole with six to eight inches of sharp coarse gravel, and a road will be formed that will remain in very good condition for a considerable length of time, even over very soft ground. Such a road it is hardly possible to build except where timber is very plenty, on account of the great amount required in its construction.

IMPLEMENTS NEEDED.

The implements which above all others are best adapted for this work are the *road scraper* and the *plow*. The plow requires no special mention here. The *road scraper* should have more width in proportion to its depth than in the ordinary land scraper. Instead of having the bottom rounded in the usual manner it should be made perfectly flat.

The scraper owned by the College was made at Dearborn, Mich., and although not so well adapted for a road scraper as some made for that especial

purpose, it is a great improvement over the ordinary land scraper. It is slightly rounded on the bottom, it has a cutting edge of fully four feet; it is two feet from the cutting edge to the back of the scraper; the back is eight inches wide, and makes an oblique angle with the bottom. The handles are fastened as in ordinary scrapers; they are of two feet in length and are connected near their free extremities by a round bar of wood. The cost of the scraper was ten dollars.

The Chicago Ditcher and Scraper Company make an excellent form of road scraper, which they guarantee to be made of best materials, and of approved workmanship. These scrapers have proved highly satisfactory, so far as I can learn, to all who have tried them. The price certainly is very reasonable. At a competitive test under the auspices of the Agricultural Society of the State of Illinois, at Roberts, in Ford county, Ill., August 11th and 12th, 1875, a road * eighty rods long and thirty-nine feet wide from ditch to ditch, was made at a cost of less than seventeen cents per rod, calculating man and team at three dollars per day.

PRACTICAL DIRECTIONS.

The following methods of preparing a turnpiked road are followed by different road makers. It may be advisable in many cases not to employ any one method to the exclusion of the others, but to employ a combination of the methods, or one a portion of the time, and the other the remainder:

First method (employed by Prof. A. B. Gulley in building the Detroit & Saline gravel road).—This requires one teamster and one or two men to handle the scraper, the number depending on its weight. On the side of the roadbed and parallel to it, plow just the number of furrows that will give a good scraper load when the scraper is drawn square across the road. Two or three furrows will be sufficient; if too many are plowed the scraper will not do clean work. Scrape these upon the roadbed by driving square across the road to the center, then back to the place of loading, having the men pull back the scraper, and the teamster attend to the team alone. Treat the other side of the road in the same manner. Then plow again on the first side outside of the first furrows and scrape as before. Proceed in this manner until the road has been brought to the required form, finishing up the side channels as directed.

Second method.—This differs from the first in no essential manner except in driving from one side of the road to the other, taking loads alternately from each side of the road and leaving them as before described. The labor required in handling the scraper will be less than in the first method.

Third Method.—The third way of constructing a turnpike road is to first plow the sod on the side of the road the width of the ditches, which should not be less than $10\frac{1}{2}$ feet for a road bed 24 feet wide; second, scrape the turf or sod upon the center of the road, striking the furrows endwise with the scraper and having the team pass around in a circle; third, when the sod the whole width of the ditches is removed to the road-bed, plow again, making the furrows deeper to the center of the ditches. Scrape this earth upon the road-bed, rounding up the center and filling all inequalities caused by the sod; fourth, drive lengthwise of the ditch with the scraper and remove all obstructions to the continuous flow of water. One man only is required by this method, the manual labor is considerably lessened as compared with the other methods, though the team work is increased. The relative cost of the different methods will depend

* This road was of the same form, in most particulars, as the one described, and had a road-bed of twenty-five feet in width.

upon the relative cost of hand and team labor, and upon the skill of the workmen. It is generally thought that under most circumstances the third method costs somewhat more, but as the sods (if there are any) are all placed at the bottom by this method it gives a more uniform and somewhat better road than either of the other methods.

The following table is computed on the supposition that all the earth required in forming the road-bed is derived from the side ditches. The slope of the side of the road-bed, from bottom of ditch to the center, is little more than one inch per foot, and the slope of the outside of the ditches is four inches per foot:

WIDTH OF ROAD BED.	DEPTH OF DITCH IN INCHES.		HORIZONTAL DISTANCE IN FEET.		Cubic Yards per Rod.
	Below Original Surface of Ground.	Below Center of Road.	From Center of Road to Bottom of Ditch.	From Bottom of Ditch to Outside.	
36	17.50	31.49	10.94	4.37	13.64
32	15.50	28.63	9.69	3.87	10.71
30	14.50	26.76	9.06	3.62	9.37
28	13.50	24.89	8.44	3.37	8.12
26	12.50	23.02	7.81	3.12	6.96
25	12.00	22.08	7.50	3.00	6.42
24	11.50	21.15	7.19	2.87	5.89
22	10.50	19.28	6.56	2.62	4.91
20	9.50	17.41	5.94	2.37	4.02
18	8.50	15.52	5.31	2.12	3.22
16	7.50	13.64	4.69	1.87	2.51
14	6.50	11.75	4.06	1.62	1.88
12	5.50	9.87	3.44	1.37	1.35
10	4.50	7.99	2.81	1.12	.90
8	3.50	6.11	2.19	.87	.55
6	2.50	4.22	1.56	.62	.28

COST OF TURNPIKED ROADS.

The cost of a road, with the dimensions as given for the road-bed 28 feet wide, is estimated by the Chicago Scraper Company to be 25 cents per rod.

Prof. A. B. Gulley, who has had considerable experience in road making, thinks the estimate is not unreasonable with skilled hands, but that it would probably cost from one-fifth to one-half more with the labor usually employed on roads. The actual cost, however, will vary greatly with circumstances. Skill in the management and the proper disposition of men will often bring profits to a contractor, when another under the same circumstances, but without this skill and tact, will constantly lose money. Again, it is a well known fact that when work is scarce, even though wages are low, men work much better than when work is plenty and wages high; indeed it is commonly claimed when laborers are scarce and wages high that they can scarcely be depended on for more than three-fourths of the work they readily accomplish when wages are low, and when fresh hands are waiting to be hired in case any are discharged. Again, long spells of either wet or dry weather may make the earth more difficult to move, and add considerable to the cost.

The following table of cost for moving earth is based on a paper by Ellwood Morris, C. E., of Philadelphia, published in the Journal of the Franklin Insti-

tute, 1841, which has been extended to cover the cost of moving earth by scrapers. *The following basis of calculation was adopted: labor of man one dollar per day; of horse 75 cents per day; of plow 37 cents per day, and of scraper 25 cents per day. The results in our table must therefore be increased or diminished in about the same proportion as common labor costs more or less than this. It is supposed that one man does all the scraping, and keeps his team continually walking in a circle. The radius of this circle will approximately be the distance from the bottom of the ditch to the center of the road, although the centers of gravity of the space to be filled and the earth to be moved are somewhat nearer.

It is further assumed that seven scraper loads are required to move each yard of earth, which is about the average scraper load for a *good* road scraper. A skillful hand can hold the scraper so as to increase the amount of this load a good deal, but care should be taken that the scraper do not gouge into the ground which has not been loosened by the plow, as it will unnecessarily strain the team and soon tire them out, while it will give no increase to the load; on the contrary it will usually result in the complete or partial emptying of it.

Horses usually walk, before a loaded wagon, two and one-half miles per hour for ten hours per day, but walking and constantly turning, the rate will probably be diminished to about one and one-fourth miles per hour, or about one hundred feet per minute.

The cost of loosening the earth with a plow is given by Trautwine as follows:

Strong heavy soil.....	1.6 cents per yard.
Common loam.....	0.8 " " "
Light sandy soils.....	0.4 " " "
Very stiff pure clay or cemented gravel.....	2.5 " " "

And the cost of spreading for the heavy soils one and one-half cents per yard, and for sandy soils one cent per yard, where wagons or carts are used. Since most of the work of spreading is done by the scraper, the cost of spreading and leveling can safely be estimated at one-half of one cent per yard. The cost of clearing up and finishing the ditches cannot well be estimated, as it will vary much with different surfaces. For that reason the cost of finishing the ditches is not included in the following table of the cost per rod of turnpiked roads.

* Same data adopted by Trautwine, p. 435.

Width of road bed in feet.	Distance earth has to be carried in feet.	Distance passed over by team in feet, for each load.	No. of loads per hour, velocity 100 feet per minute.	Yards drawn per day of 8 hours	No. of cubic yards excavated per rod.	Cost per cubic yard of scraping, cents.	TOTAL COST PER YARD IN CENTS.				TOTAL COST PER ROD IN CENTS.			
							Very stiff clay.	Heavy soil.	Loam.	Sand.	Very stiff Clay.	Heavy soil.	Loam.	Sand.
36	33.3	104.3	57.7	65.94	13.64	4.18	7.18	6.28	5.48	5.08	98.0	85.7	74.8	69.3
32	29.6	93.0	64.5	73.71	10.71	3.74	6.74	5.84	5.04	4.64	72.2	62.5	54.0	49.7
30	27.7	87.0	68.9	78.81	9.37	3.49	6.49	5.59	4.79	4.39	60.8	52.4	44.9	41.1
28	25.8	81.0	74.1	84.68	8.12	3.24	6.24	5.34	4.54	4.14	50.7	43.4	36.9	33.6
26	23.9	75.1	80.0	91.44	6.96	3.00	6.00	5.10	4.30	3.90	41.8	35.5	29.0	27.1
25	23.0	72.3	83.0	94.85	6.42	2.88	5.88	4.98	4.18	3.78	37.8	32.0	26.8	24.3
24	22.0	69.1	87.0	99.44	5.89	2.76	5.76	4.86	4.06	3.66	32.4	28.6	23.9	21.6
22	20.1	63.1	95.0	108.56	4.91	2.52	5.52	4.62	3.82	3.42	27.1	22.7	18.8	16.8
20	18.2	57.2	104.8	119.77	4.02	2.29	5.29	4.39	3.59	3.19	21.2	17.6	14.4	12.8
18	16.4	51.5	116.4	132.99	3.22	2.06	5.06	4.16	3.36	2.96	17.0	13.4	10.8	9.5
16	14.5	45.6	131.6	150.33	2.51	1.83	4.83	3.93	3.13	2.73	12.12	9.9	7.9	6.8
14	12.6	39.6	151.5	173.14	1.88	1.60	4.60	3.70	2.90	2.50	8.7	6.9	5.4	4.7
12	10.8	34.7	172.4	197.04	1.35	1.37	4.37	3.47	2.67	2.27	5.90	4.7	3.6	3.1
10	8.9	28.9	208.3	238.19	0.90	1.14	4.14	3.24	2.44	2.04	3.7	2.9	2.2	1.9
8	7.0	22.0	272.7	311.69	0.55	0.91	3.91	3.01	2.21	1.81	2.2	1.6	1.2	1.0
6	5.2	16.1	334.6	439.55	0.28	0.69	3.69	2.79	1.99	1.59	1.0	0.8	0.6	0.5

UNDERDRAINING.

The best possible arrangement of surface drains will not remove all the water from the road, and in many cases other methods of removing the water must be adopted. The best of all methods will doubtless be found by combining a thorough system of underdrainage with that of turnpiking. In all cases the cross section should have the convex form as shown in Fig. No. 2, so as to prevent as much as possible the absorption of water by the surface of the roadbed proper, which, though not perfectly impervious to water under any system of construction, it will, when of this shape, convey the greater portion of the water that falls upon it into the side channels. Even when the underdrain is directly beneath the axis of the road, it is not advisable that the water should reach it by soaking down through the traveled portion of the road, which it would render soft and muddy, but it should be, as far as possible conveyed to the side channels, and from thence to the underdrain, thus leaving the track in the center as dry as possible.

The advocates of underdrainage of roads present three systems which vary in cost and efficiency. Mr. J. Bailey Denton, in the Journal of the Royal Agricultural Society of England for 1857, advocates two two-inch drains beneath the two edges of the road-bed or traveled portion of the road, and consequently about twenty feet apart. The other systems find advocates in Gen. Q. A. Gilmore and in Geo. Waring, and are as follows: 2d, two underdrains, one beneath each ditch formed in turnpiking the road; 3d, one underdrain beneath the axis or center line of the road.

Denton's system, though excellent when carried out with the broken stone covering that he recommended, has few features to recommend it for use on a road where in all probability no covering beside the native soil will be applied. The total cost per rod of such tile drain is reckoned by him at less than one English shilling, where the tile costs 20 shilling (English) per 1,000 feet and labor of excavating costs 3 pence per yard, and laying and treading in $6\frac{1}{2}$ pence per chain of four rods.

The second system, in which a drain is placed directly beneath each side ditch, formed in turnpiking, has the advantage of relieving the side ditches of much of their work, thus keeping them more free from water, and the disadvantage of being so far from the center of the road as to affect but little the water that may be beneath the travelled way.

The third system, in which one drain is placed directly beneath the traveled way, has the advantages of being cheaper than the others, inasmuch as less tile and labor would be required, and of conveying away rapidly the water directly beneath the traveled track, and the disadvantage, if it be one, of affecting but slightly the water that may be in the side channels. Two drains of two-inch tile are recommended in both the other systems, and one of three-inch in this.

The third system, where a single under-drain is placed beneath the axis of a well turnpiked road, will provide efficient drainage for all cases that will ordinarily arise, and is the only method that will be considered farther in this article, though, in many cases, the others may be preferable. We may add, however, that with a road surface of gravel or broken stone, a very large proportion of the water would be conveyed at once to the open side ditches, and the second system of under-drains would, in such a case, be preferable to the third; but with our ordinary roads I am inclined to believe a single drain beneath the center of the road preferable to two, one under each open side ditch.

It is not within the province of this article to treat fully of the various methods of underdrainage. The points requiring most attention are the only ones here mentioned. The drain should be not less than three feet deep, and whenever practicable four feet deep. An outlet should be provided in every depression of the road, which outlet must consist of a transverse underdrain or a culvert emptying in a stream, water-course, or reservoir, where the presence of water will not affect the road.

The drain should run from this outlet with a continuous ascent in both ways to the top of the nearest elevations that lie in the line of the road. Here the ends may be stopped and a break of a few feet left in the drain, or it may be continued on uninterrupted to the next depression, where another outlet must be formed, as described.

The tiles should be laid with the closest possible joint, and the joint should be farther protected by a *collar* made on purpose, or by a closely mowed piece of tough turf a few inches square, laid with the grass side towards the tile so as to enclose the joint. The tile should be round in the cross section, so that it may be laid any side up. On no account use *horse-shoe* tile, whether with or without a bottom. Where tile cannot be obtained, stone or brush may be used; but the drain formed by them will be inferior to that formed by tile. A stone drain may be formed by making a channel with flat stone, or by putting in small cobble stone promiscuously, to the depth of eight or twelve inches, and covering with straw and earth. Brush drains are made by laying the brush length-

wise the drain, with the small end toward the outlet. I have known stone drains, made as above described, to work well, but I have had no experience with brush drains.

COST OF UNDERDRAINAGE.

The cost of tile at the brick kiln near Lansing is as follows: Two-inch tile costs \$12.50 per one thousand pieces; three-inch tile costs \$16.00 per one thousand pieces; four-inch tile costs \$30.00 per one thousand pieces; which would be per rod, for the two-inch tile about 21 cents; for the three-inch tile, about 26 cents; for the four-inch tile, about 50 cents, as each tile is one foot in length. It is commonly estimated that two-inch tile can be made with a good living profit for \$11.00 to \$11.50 per one thousand, so the rates should not differ much from those at Lansing near any manufactory within the State. Where the cost of transportation is very great, the expense of the tile will be considerably increased. The cost of two-inch tile delivered will be assumed \$15.00 per one thousand or 25 cents per rod, which allows \$2.50 per one thousand to pay cost of delivery; the cost of three-inch tile delivered will be assumed at \$18.00 per one thousand, or 30 cents per rod; of four-inch, delivered, about 55 cents per rod, in the following table.

The cost of digging, with labor at one dollar per day, is estimated by Waring to average for drains four feet deep, 29 cents per rod, and for laying and filling 7 cents per rod. At the same rate per yard a drain 3 feet deep would cost for digging 18½ cents per rod, and for filling 4 cents per rod.

Gen. Gilmore gives the cost of cutting and filling a drain two feet deep, with labor at one dollar per day as 15 cents per rod; this, when covered with the earth scraped in from the side channels, would, for a roadbed 25 feet wide, be made nearly three feet deep. Henry F. French estimates the cost of the cutting and filling of a drain four feet deep 33½ cents per rod; of a drain three feet deep, 20⅔ cents. The drains should be dry and laid before the turnpiking is done, thus saving the cost of digging through the earth scraped into the center of the road. The drains can be filled in all cases with the road scraper.

The following table of costs is based on estimates of French; it might have been extended to cover drains in a variety of soils, as in the preceding table relating to cost of turnpiking, but it was thought that the average would be sufficiently accurate:

TABLE OF DATA FOR UNDERDRAINING ROADS.

Width of road bed in feet.	Depth below original surface which will give a drain 4 feet deep when turnpike is finished.	Cost per rod for cutting and filling, in cents.	TOTAL COST PER ROD OF TILE DRAIN, IN CENTS.			TOTAL COST PER ROD OF TURNPIKING AND UNDERDRAINING ON HEAVY SOIL IN CENTS.		
			2-inch tile.	3-inch tile.	4-inch tile.	2-inch tile.	3-inch tile.	4-inch tile.
36	2 feet 10 inches -----	18.9	43.9	48.9	73.9	129.6	134.6	159.6
32	2 " 11 " -----	19.8	44.8	49.8	74.8	107.3	112.3	137.3
30	3 " -----	20½	45.7	50.7	75.7	98.1	103.1	128.1
28	3 " ½ inch -----	21.5	46.5	51.5	76.5	89.9	94.9	119.9
26	3 " 1½ inches -----	22.4	47.4	52.4	77.4	82.9	87.9	112.9
25	3 " 2 " -----	22.8	47.8	52.8	77.8	79.8	84.8	109.8
24	3 " 2½ " -----	23.2	48.2	53.2	78.2	76.8	81.8	106.8
22	3 " 3 " -----	24.1	49.1	54.1	79.1	71.8	76.8	101.8
20	3 " 4 " -----	25.0	50.0	55.0	80.0	67.6	72.6	97.6
18	3 " 5 " -----	25.9	50.9	55.9	80.9	64.3	69.3	94.3
16	3 " 6 " -----	26.7	51.7	56.7	81.7	62.6	67.6	92.6
14	3 " 7 " -----	27.5	52.5	57.5	82.5	59.4	64.4	89.4
0	4 " -----	33½	58.3	63.3	88.3	53.3	63.3	88.3

FALL OF DRAIN.

The fall that is given the drain may be varied a considerable; it should not be so great that the water will tend to follow along on the outside of the tile and undermine it, nor so little that the drain will not discharge freely. These limits must be determined to a great extent by the nature of the ground, but in general the extreme limits for ordinary workmen will be from eight feet to three inches fall in 100 feet measured horizontally. It is hardly safe to depend upon a drain laid with slopes greater or less than these extremes, though drains have been laid and performed satisfactory work with a fall of one-tenth of a foot in 1,000 by exercising great care in keeping the fall uniform and the joints tight. In soil difficult to wash it is probable that drains with a slope greater than 8 in 100 or 1 in 12½ could be made and laid so as to retain their positions; but in most soils it would not be advisable to try a slope even as steep as 8 feet in 100. The surface of the road should never rise more than one foot in going 25 horizontally, so there will be no need of caution for getting drains too steep; but in some cases it may happen that a sufficient fall can only be obtained by making the outlet deeper than the end of the tile. Suppose the road lie across a level marsh one mile in width as an extreme case; suppose farther that outlets can be provided in but six places and are one-sixth of a mile apart, the two outer of which are one-twelfth of a mile from the edge of the marsh; this will require each drain to be one-twelfth of a mile long; if the outlet be made four and one-tenth feet deep and the extremity three feet deep, a fall of three inches in 100 feet will be secured, and the water of the subsoil will be conveyed rapidly away. In such a case as this last the outlets will be very expensive. They should consist of ditches with a sufficient capacity to convey the water rapidly away from the mouths of the tile and also from the open side ditches. The case in which outlets could not be provided has already been discussed under

the head of turnpiked roads, and will need no further discussion here, as underdrains could possibly do no good.

BOOKS OF REFERENCE.

If detailed instructions in the formation of underdrains are needed, the reader is referred to *Draining for Profit and Health*, by Geo. Waring, and to *French's Farm Drainage*, both of which works are published by Judd & Co., New York. In the Report of the Michigan State Board of Agriculture for 1873 there is an article, well illustrated, by Prof. M. Miles, entitled *Improvements in Tile Laying*, which is well worth careful study.

ADDRESS BY HON. A. B. MAYNARD AT THE ARMADA FAIR, OCTOBER 4, 5, 6, 1876.

It would be the merest affectation on my part to attempt to instruct a society of practical farmers in the business of agriculture, and should I venture to suggest the results of my limited experience, I fear the profit and loss account would not be inviting; but a business of such vast importance to all classes, and of such controlling influence on the welfare of the nation, deserves the encouragement of all. We recognize the fact that its products are the foundation of all our material prosperity; that they are the substratum of all other industries, and the success of all others depend upon them. Our commercial, manufacturing, and mechanical employments all rest upon and are supported by them. It is the business that stands in the front rank of all others,—is the main pillar in the edifice,—absolute in necessity and highest in utility.

Without, then, any instructive experience in the business of farming, I at least may express my appreciation of the value and dignity of your calling, its compatibility with the highest moral development, its wholesome influences upon those engaged in it, and the efforts that should be made to carry it to a higher standard of perfection, and the encouragement that should be held out to our American youth to engage in its service.

I am aware that the thoughtless in other departments of business entertain the idea that bone and muscle are all that are required to make a good farmer, and that beyond a knowledge of the manual labor of the farm all improvement is useless. All intelligent men, however, know that there is scarcely any other employment in which the rewards of intelligent labor are so sure and immediate as in this, and hence the farmer should have a practical education in all that pertains to the business of husbandry. In all other departments of industry success is scarcely ever reached without at least a general knowledge of the principles involved. As a rule the successful merchant has served some years of apprenticeship, has pursued a course of study in reference to it, has made himself familiar with the products he deals in, and by carefully studying the markets has learned where he can buy the best, so as to sell the cheapest, and by the application of sound judgment, energy, and industry succeeds in accumulating a fortune or competence, while a majority of his brother merchants, as experience proves, fail and die bankrupts. So with the mechanic and manufac-

turer who has been thoroughly skilled in the principles or handicraft of his calling, his success is almost certain. He frequently improves the quality of the article he fabricates by some new combination of materials used, or by improvements in machinery employed to do the work by which he is enabled to produce a better article at the same cost, or one equal to the average at a much cheaper rate. So with the professional man; he must spend some years in preparatory studies to fit him for the study of his profession, and then, after years of patient effort, he is fortunate if he attain to such a rank in his profession as will insure him a business that will give him at the close of life a moderate fortune. What reason then is there to suppose that your calling is an exception to all others, and that you can be really successful agriculturists without intelligence, mental discipline, and training? Ought not the farmer to be able to understand and become thoroughly acquainted with the elements that compose the soil which make up his fields before he can intelligently judge what he can properly demand of them? Must he not know what crop in perfection they are the best calculated to produce, and when they are deficient in any qualities how they can be most cheaply supplied, and the best method of applying them? Should he not be able intelligently to understand that there is a necessary connection between the quantity and quality of food they require and should receive in order to be able to meet his expectation of a large yield and of good quality? In short, he ought to know that it is absurd to suppose his land will perform well unless he feeds it well. Might he not just as well expect his teams to be strong and vigorous, and do a good season's work on poor, insufficient, and unpalatable food, as to expect his lands to produce well without supplying the soil with the materials requisite for a full and perfect development of the crop to be raised? Can he expect to overtax his lands, to starve them out without having them become exhausted, barren, and unproductive? Ought he not further to know that when they once become poor and exhausted the expenses attending their recuperation into a good thrifty productive condition are more than threefold the advantages he apparently gets from having overtaxed and underfed them?

On this subject I speak from experience, for when I bought my farm in Ray it would not raise anything but mulleins and mortgages, and the mullein crop was not anything to brag of. By dint of thorough cultivation and energy my boys now are not afraid to compare crops with their neighbors. Compensation is the law of nature, and mother earth demands its fulfillment as much as men and other animals that feed upon her bounty. If you want your hired help to do well, feed them well and pay them liberal wages. Do not expect that mush and milk instead of good, substantial food, and niggardly wages are going to give them a very deep interest in your success, or that their labor will be very remunerative to you. Paul was right when he said, "Milk for babes, but strong meat for men." I am aware that there is a class of men living upon farms who are not accustomed to scrutinize the different characters of soil so as to adopt the mode of cultivation most likely to produce success, and who pay little or no attention to the proper rotation of crops, or the best method of keeping up and replenishing their lands. They follow along in the old beaten track of their ancestors, and if they are poorly remunerated for their labor,—as they surely will be,—they are apt to attribute their failure to anything but the true cause; they are apt to get discouraged, think farming is a poor business, sell out, and move into some city or village, put their little means into some business that they are not acquainted with, and in a few years find them-

selves without a home; their children perhaps have fallen into the habits of village loafers, too indolent to work, and too proud to beg, and in the end become patrons of whisky-shops, jails, and prisons. This is the experience of many families following the noblest and most independent of all occupations. They become weary of its labors, or discouraged, or hope to gain a livelihood without digging it from the soil. They have sold out and rushed into your villages and cities to add to the number of drones in the hive of human industry, and to give their sons a preparatory course in the whisky-shops, to insure their admission sooner or later into the penal and reformatory institutions of the State. But I am impressed with the belief that these sad lessons of change from farm to village life are growing less frequent, and the spirit of inquiry and progress that now so generally exist in our farming community are rapidly leading our rural population to a better knowledge of their pursuits. Not only do they begin to appreciate its substantial security, but the sturdy independence which the farmer enjoys, so that instead of looking upon his labors as toilsome drudgery, it will become inviting and attractive, and in the light of a higher and broader intelligence, with the constantly increasing labor-saving machines, the employment of the agriculturist will be regarded with favor and give him leisure to study the processes of nature by which the products of the earth are brought forth to feed and bless mankind. Then, instead of sowing his fields at random he will know what land is ready for the plow, and what grain with a fair season it will bring to the harvest worthy of the sickle. I have no doubt your own experience has demonstrated that the same acreage of ground by proper care and cultivation has produced double the amount with but a trifling increase of labor or expense, so that you have been enabled, like the merchant or manufacturer referred to, to enter the market with a better article and at less cost than your less enterprising neighbors.

I can appreciate fully the embarrassment which some farmers labor under from lack of means to make the improvements they desire, and that especially when they purchase lands that are badly impoverished. Their recuperation must be slow unless considerable of an outlay is made; but some progress can be made without seriously interrupting the labor of the farm by gathering materials for beds of compost at odd jobs and by a little extra care in gathering and saving your manures and by adding such fertilizing substances as are wasted and thrown away. But whether I am right in this or not, one thing you may rely upon, that you will never improve your condition by starving your lands any more than by starving your stock. You could sell your hay and grain and starve your cattle and sell their hides in the spring, and in that way get two crops a year if you think that is profitable.

I am aware also that experience demonstrates that the margin of profit is always the largest when the lands are kept in the best condition and under the most thorough cultivation. In this connection may I not suggest that the kind and different breeds of stock that are to be kept and reared upon the farm is worthy of your consideration. But it would be useless to get thoroughbreds unless you are prepared to give them good keeping. If you expect them to endure the storms of winter without shelter and live on thistles and buckwheat straw, then keep scrubs. They will stand it without food as long as Jonah did in the whale's belly. I am satisfied from my own experience that there are great advantages in keeping the improved breed of hogs; that there is a saving of from thirty to fifty per cent in the cost of fattening between the Essex or Suffolk and the old fashioned lop-eared, long-snouted races that were formerly

raised. One of them would eat through a twenty foot corn crib and then squeal for more.

But passing from this branch of the subject, allow me to submit that agriculturists do not need to entertain any class of opinions or any jealousies of the various other industries that exist in every well organized community. As all lawful pursuits are so interwoven together and are so inseparably connected, as a rule when one prospers all prosper. All depend upon the products of the farm, and all aid the farmer in furnishing a home market for his surplus, and without the prospect of a remunerative market there will be poor encouragement for the labor bestowed beyond the amount required for your own consumption. The hope for gain in all branches of business is the motive power to human industry, and applies alike to all the occupations of life. I am aware that farmers apparently receive lower rates of gain than the merchant or manufacturer, but when you consider the certainty and security of their calling, the comfortable support of their families which the farm furnishes, you have no reason to complain. As a rule they live well but frugally, labor faithfully, and at the end of the year the balance remaining shows the profit of their year's business. But beyond this, if properly attended the farm is gradually improving, and its value in the market is increasing as the country grows older and more densely populated. Most of the wealth that exists among the middle classes is that which results from the increased value of the land. Then let the farmer do all that he can to support all other legitimate industries and patronise the mechanics, merchants, and manufacturers in his neighborhood, thereby building up a home market for his products, while at the same time he has the advantage of the open markets of the commercial world. There is no necessity of your forming yourselves into close corporations to avoid the middlemen or any other class, and when the farmers undertake to be their own merchants, manufacturers, and mechanics, they make a mistake and are generally the losers. Competition is sharp enough in all these different branches of business, and especially in communities as old as this, so that you need have no fear of being compelled to pay an extravagant price for the articles you wish to buy or the work you wish to have done. Live and let live should be the farmer's motto, and not begrudge the merchant or mechanic the pittance he may make out of your custom, or get irritated because at the end of the year he should invite you to pay your bills.

I can and do highly appreciate the advantages of agricultural societies, where you meet to exhibit your stock, your agricultural products and improved implements of husbandry; to consult together, and to compare views on all things connected with your calling. But I regret to see that in many cases these fairs have run into an exhibition of horse racing, which destroys all their value for the legitimate purposes for which they are organized, and brings together a class of small gamblers and petty thieves that disgrace the society, debauch the morals of our young men, and apparently make the honest yeomanry the patrons of trickery and fraud. The fact that your society prohibits this, and confines itself to the legitimate objects of a farmers' fair, induced me to accept your invitation to make this address.

Whilst your calling requires you to be frugal and industrious and temperate, there is nothing connected with it that justifies you in being stingy or parsimonious, either to your families or to others. You must recollect that the good housewife has the hardest task of the two; that she is isolated in a large degree from the society of neighbors; that her tasks are never done, and as a

general thing she has no rainy days or Sundays, and you can promote your real interests in no other way better than to indulge her tastes about the homestead by keeping things neat and orderly, and allowing her to exercise her own judgment about the household expenditures. Do not leave her to do her own work and then part of yours by gathering the fuel, feeding the hogs, milking the cows, and building the fires in the morning. Do not get on a liberal streak and give her a quarter of a dollar, and then wonder for the next six months how on earth she spent it. In short, so conduct yourselves as to make your homes cheerful, comfortable, and pleasant for the family, and then home influences, associations, and memories will be strong supports for your children when they are separated from the family circle. Do not think your wife and daughters are "stuck-up" because they can tell the difference between the smell of a hog-pen and a bed of roses, and prefer the latter instead of the former in the front-door yard. In short, recognize the fact that cleanliness is next to godliness, and instead of spending your Saturday afternoons lounging about some village saloon drinking whisky and peddling scandal, clear up the grounds about your house so as to make them inviting and attractive.

Passing from this, consider for a moment the vast acreage of our rich, new, and beautiful territories, lying in latitudes where the climate is healthful and salubrious, and fee simple titles are given by the government to the actual settler under our homestead laws at a mere nominal price, with superior natural facilities for the transportation of produce to market by our numerous inland lakes and rivers, and the railroads that are sure to be built in the track of every new settlement, bringing them into commercial connection with the great centres of business, and then estimate if you can the agricultural products of this country in the next fifty years. Note the progress we have made in the last quarter of a century in the quantity and quality of our products, and the improvements in all the implements by which the labor of the farmer is supplied. Mark the vast change in the public sentiment in respect to the respectability and advantages of your calling; consider its safety from hazards, its certainty of support, its glorious independence of public fashion or caprice, and its healthfulness to mind and body. Witness now the institutions of learning scattered all over the land giving instructions to young men, and specially adapted to qualifying them for practical, successful farmers, thus demonstrating that we have made vast progress. It is now held that a thorough, systematic education is as important to the agriculturalists as to any other trade or profession.

Then with these advantages already secured, with our vast territories with their fresh and unbroken soils, with the rapid emigration from the old world seeking homes where the price of lands are within the reach of all, and feeling the dignity of their advanced condition in life as free men and owners of the soil they cultivate, making themselves homes, rearing up their families and extending their possessions,—who can comprehend the magnitude of this interest at the next centennial should our glorious free republic remain unimpaired?

In this connection let us briefly consider the influences of agricultural employment in developing and strengthening that love of liberty without which no free government can long exist. The history of the past demonstrates the fact that the concessions that have been gained for liberty and freedom have been obtained through the influence of the agricultural classes. This is the uniform history of all governments the world over. The calling naturally begets a love of independence and self-reliance, and a hatred of oppression, without which

liberty and freedom would have no security. The principles of Luther, which our forefathers brought with them in the Mayflower, developed and strengthened by their agricultural pursuits, gave them that manly courage and heroism, self-sacrifice and sturdy uprightness of character that enabled them successfully to resist the oppressions of the mother country, and fully developed in them the principle that taxation without representation was unjust and ought not to be endured. These same influences enabled them after they had been victorious to establish a government without precedent, based upon the glorious principles embodied in our Declaration of Independence,—“That all men are created free and equal, and endowed with certain inalienable rights, among which are life, liberty, and the pursuit of happiness.” Thank God the slave-holders’ rebellion has made those principles a living reality, and freedom is now the birthright of every man and woman upon our soil. A government of the people, combining liberty with order and freedom with security, is the natural outgrowth of the development of your honorable calling. In fact, so to speak, we are a nation of farmers, owners of the soil, and this accounts for our marvellous growth and for the great inventions and improvements that have lifted your profession from physical drudgery to the controlling hand and directing mind of the husbandman over the implements of husbandry, by which a large share of his labors are performed. The man who owns his farm, lives upon it, and devotes his labors and energy to its cultivation, feels a consciousness of adding to the world’s wealth; he is grateful for the dews and showers that a good Providence orders, and trusts his labor on the divine promise of seed-time and harvest. Such a man must be depraved unless he loves liberty and will fight to preserve it; cherishes the religious institutions of the country as the true handmaid of all our better progress, and will cheerfully encourage and support them. To what class in community were we most indebted for our armies to crush out the slave-holders’ rebellion, if not to the agricultural community?

Make any man the owner of the soil that raises his bread, and his courage, his self-respect, his attachment to his government is immeasurably increased. It gives him that attachment to place so well expressed in the couplet of Scott:

“Lives there a man with soul so dead,
Who never to himself hath said,
This is my own, my native land.”

Every thinking man knows that the real security of our free institutions rests with the inhabitants of our rural districts, and not with those of large towns and cities. Where else but in the slums of New York could you have elected a notorious gambler and prize-fighter as one of your law makers? No party necessity could induce my Democratic or Republican friends in the rural districts to give support to such a wretch as John Morrissey. They would fly from him as from a deadly pestilence.

Again, no other pursuit is so well calculated to impress us with the goodness and wisdom of our Maker. Who can breathe the pure air of our open fields, and watch the growth and development of the trees, shrubs, plants, and flowers, without being profoundly impressed with the mysteries of God’s creative power?

No other employment develops so strongly the strong family attachment that makes so important a part of our social happiness. Who does not enjoy the return to the old homestead, where it has been kept in the family, as it ought to be, if possible, and reflect upon the father’s labors that redeemed it from

the forest, that planted the orchard,—the fruit of which he now enjoys,—and dream over again his boyish hopes and fancies, and weigh them in the scales of the past?

If, then, the pursuit of agriculture naturally develops the better qualities of our nature, and is a wholesome, health-producing employment, and gives sufficient returns to enable us to enjoy the rational comforts of life, why is it that so many of our young men and women have such an aversion to it? Its drudgery has passed away by the inventive genius of the country; the scythe, the sickle and cradle have given place to the reaper and mower. The old flail is forgotten, and your threshing machines perform in a day the work of a winter. Your planters and cultivators almost dispense with the hoe, and in fact, horse-power and machinery do the work, and the farmer is the intelligent agent that controls results.

Again, did it ever occur to you that as a rule all the ablest and most distinguished statesmen, and generals, and leading men in all the learned professions were the product of farm life, and not of cities and villages, that they were sons of farmers, born and reared upon the farm and accustomed to its labors. Lincoln, Webster, Wright, Clay, Douglas, Grant, Sherman, and a host of others, were sons of farmers, raised upon the farm. Then what higher inducement can be held out to our American youth to select this employment for a business for life? Well selected lands can be obtained without capital, and all you need for success is health and industry. It is an employment that stands well in the public judgment, and the prevailing sentiment of all classes is that whatever contributes to the improvement of the condition of the farmer tends directly to fortify and sustain the social fabric and gives new life and strength to our national character. All other classes are dependent upon and contribute to your demands, the commercial and manufacturing classes make large outlays for canals and railroads to cheapen the marketing of your products. You know that while the sun holds on in its course, giving light and heat, and rain and dews descend, the ungrudging soil will, if properly fed, yield a harvest and your labors will be paid. It is certain to produce for you a comfortable living and a competence for old age. Is it not better, then, than the chances of hastily made wealth in other employments? The book of books says that "he that hasteneth to become rich shall surely come to want," and further, that "he that tilleth his land shall have plenty of bread, and that he that trusteth in the Lord shall be made fat." They were not farmers whom our Saviour drove from the temple, but a lot of money changers who lived upon the labors of others.

Then with the farmer there is no reason for failure if he is temperate, frugal, and industrious, but if he has spent his time in some groggery, smoking poor tobacco and drinking worse whisky, and calls that farming, he may fail. He is surprised that his farm is so good for weeds and so poor for crops, don't believe much in fences, but keeps dogs to fence his horses and cattle in. Such a man would have failed in paradise, and never have consented to the sin of eating of the forbidden fruit if he had had to cultivate it for himself.

Again, the farmer is entirely independent. He does not have to seek the patronage of anybody; he is not obliged to yield his convictions on any subject lest his church, patients, or clients will be offended. He trusts in his own right arm and the blessings of Providence for his success, and neither the shipper nor the consumer cares to canvass his opinions. Not so with those dependent upon public favor. If residing in a community of drunkards they must not denounce drunkenness, and so of other offenses.

Then why is it that there are so many idlers in every community when success in this calling is open to all who have industry and good habits, and from what classes do they spring? As a rule they are the products of cities and villages. They have been brought up with nothing to do but go to school, govern their parents, parade the streets, patronize the groceries, and talk politics. They are generally rotten in crime before they are ripe in years, and the good State out of kindness furnishes them a chance to improve their morals at Jackson. This only demonstrates a fact as old as humanity itself, that idleness is the devil's work-shop, and if parents in city or country, out of a foolish tenderness, will allow their sons and daughters to grow up without thorough habits of labor and industry they not only do them a great injury and wrong, but they need not be disappointed if their gray hairs are brought with sorrow to the graves.

May I ask, is this employment shunned because the labor of it is supposed to be harder than that of any other pursuit? If so, no greater error can be made. Close application and severe labor is the only road to success in any department of business. I know that prejudice against this employment is sometimes engendered by the habits of careless farmers. If you pass a farmer's house and see cat holes in the door, rags and old hats in the window, pig-pens in front of the door-yard, heaps of filthy rubbish filled with fleas and vermin storming the family mansion on all sides, with a slop-hole at the kitchen door emitting an odor not unlike that of the all-healing waters of Mt. Clemens, I confess it takes all the poetry out of farming, and I do not blame the good house-wife in that case if she delivers caudle lectures every night; but even then such a home is preferable to a back room in a grocery, as much so as a physical pestilence is preferable to a moral one. But this filthy condition does not result from the farmer's occupation, but is the result of sheer indolence and carelessness, as nothing is easier without large expense than to keep the farmer's premises clean and attractive.

In my judgment, one of the worst signs of the times is the fact that our agricultural productions are falling off, and the apparently growing disposition of our young men and women to shun farm labor. Formerly this was not so, and young people whose parents were in comfortable circumstances would more readily take employment with the farmer than with any other class. I very much fear this sentiment among the young is due in a large degree to the false impressions of parents themselves, and to their allowing a foolish pride to control their better judgments.

If children were honestly taught that all legitimate labor is honorable and that indolence and idleness are a reproach and a disgrace to any family, do you think you would see our young men shunning the manual pursuits of the husbandman to become a clerk in some low doggery or other vile pursuit; or, if not that, would he prefer to rush into the city to be the family servant of some one, to drive a hack, or peddle essences, or be a waiter at a hotel? Would he not rather be a laborer than a loafer, starting out with the theory that the world owes him a living, and that he is going to get it as a drone or by trickery and fraud? If taught that labor was indispensable to good character, would the daughter, whose mother is worn out by toil, lace herself up and sit in the parlor whilst the mother is performing the household duties? Would she traverse the country over as a book peddler, liable to have her maiden modesty insulted, rather than to find employment in a virtuous, intelligent farmer's family? Do you not know that this disposition to avoid labor supplies with

victims the dens of infamy and furnishes inmates of our jails and prisons? Do you suppose that this would be the case if parents did their duty,—if they constantly impressed upon their offspring the necessity of industrious habits as an indispensable condition to success in life?

Then I beg you, in conclusion, to get rid of the foolish, pernicious notion that you want your children to get along without labor, if you regard their welfare and your own, or that of the nation.

“THE ROSE.”

BY MR. JAMES CASSIDY, AGRICULTURAL COLLEGE GARDENER.

The rose has been an esteemed shrub among all civilized nations from the earliest times. Its history as a florist's flower is of more recent origin, dating from 1815. Nature in her wise and lavish distribution of species has endowed temperate climes with many varieties of this “Queen of Flowers.” It is indigenous to the four quarters of the globe, containing many species with strongly marked habits and characteristics. In Europe its cultivation has been brought to the highest state of perfection, and in this country considerable attention has been paid to its culture, for America has a climate second to none in adaptation to the wants of this shrub. In no other country can more encouraging results be obtained, either in size, luxuriance, or profuseness of bloom. Its infinite variety in form and color, and the exquisite fragrance of its flowers, from the delicate odor of the Tea Rose to the more powerful fragrance of the Damask, give it the highest place in the estimation of all lovers of flowers. The well known fragrance of other flowers, such as Mignonette, Heliotrope, Violets, etc., all elaborated from the same climate by the Great Creator, are indeed wonderful. They, however, retain their peculiar fragrance the world over, but the rose is unequalled in the *variety* of its perfume.

The classification of roses is somewhat complicated, and recent writers, in order to simplify it, have divided them into two classes. The first summer or once blooming; the second autumnal or ever-blooming. To the first of these belong the Province or Cabbage Rose, favorite garden plants; also the Moss Rose. This rose is an accidental sport or bud variation of the Province. It is excellent for beds, for if its shoots are pegged to the ground with small hooks the surface will soon be covered with luxuriant foliage and flowers. They should not be so severely pruned in this country as in Europe.

The Hybrid China Rose.—In this group are found our hardy summer roses. They are free, rapid growers, and are well adapted for growing on pillars or over arbors. This group originated from seeds of the Tea, Bengal, and Bourbon roses impregnated with the pollen of the Province and other sorts that bloom only once in the season. The flowers are of great beauty, ranging from purest white to the darkest crimson.

The Scotch Rose, descendants of Rose Spinossima.—The varieties of this group owe their origin to the dwarf wild rose of the north of England and Scotland. They are of dwarf stature, producing an abundance of red, white, and yellow flowers. In early seasons they will bloom nearly two weeks before other

summer roses make an appearance. To this class of summer roses also belong the briar roses; they are distinguished by their small rough foliage and briery habit. They include the Sweet Briar (*Rosa Rubiginosa*), the Hybrid Sweet Briar (— —), and the Austrian Briar (*Rosa Lutea*); they are all hardy. The latter is a very distinct rose, and which in *Harrisonii* (a variety of American origin), we get the best hardy yellow rose for general cultivation. It should not be severely pruned.

Prairie Roses (*Rosa Rubifolia*).—This is a native family, and is fine for arbors, pillars, or for covering unsightly objects. The flowers are produced in clusters, of various shades of color, from blush white to deep red. It is perfectly hardy.

The Beursault Rose (*Rosa Alpine*), is a native of the Alps, and the hardiest of the climbing roses. It requires but little pruning.

The Evergreen Rose.—The origin of this family is the *Rosa Sempervirens*, the climbing Wild Rose of Italy. It is barely hardy at the north, but is worthy of cultivation in the Southern and Middle States.

The "Many Flowered Rose" (*Rosa Multiflora*),—a native of Japan, is of vigorous growth, and well adapted for pillars or arbors. It should have some protection in winter, although some varieties are perfectly hardy.

The Banksian Rose (*Rosa Banksianii*), is a native of China. In the Southern States the foliage is evergreen, making it one of the most graceful and beautiful of Roses. It is too tender for general planting in the garden, but is sometimes met with in conservatories at the North. Very little pruning is required, because the flowers are borne in great profusion on the small, twiggy branches, indicating the necessity of leaving them unpruned.

II.—Turning to the second division of our subject under this general classification, we observe that to the autumnal, or ever-blooming roses, we are under great obligations for that continued season of interest which we now enjoy. To have roses in autumn has, from early times, been an esteemed luxury. The Egyptians cultivated the monthly rose, and, by late pruning, so retarded the flowering season as to be able to export large quantities of roses to Rome during the early winter months.

Forcing flowers by means of hot water, seems to have been known to the Romans, for Seneca declaims against these inventions. If we can credit the ancients, our winter roses and our forcing by hot water are all of high antiquity. The most prominent group in this section are the Tea Roses, descendants of *Rosa Indica Odorata*. The Blush Tea-scented Rose was first imported into England; from China it was sent to France, where, in combination with the Yellow Tea Rose, it has been the fruitful source from whence came all the splendid varieties we now possess. The demand for this rose in the northern States for purely æsthetic purposes was grown within a few years to be something wonderful, its products yearly representing a cash value of several millions of dollars, and its volume is increasing rapidly. They require protection in winter, are free bloomers, and indispensable for pot culture, or for forcing under glass.

The Musk Rose (*Rosa Moschata*) is a vigorous grower, well adapted for pillars or trellises. Being tender, it should be taken down and protected during winter. It is generally supposed that the Attar of Roses is made from this species.

The Noisette Rose (*Rosa Noisettiana*) is of American origin. It was obtained by a cross of the common China Rose and the old Musk Cluster; the offspring

being again crossed with the Tea-scented Roses. They embrace a wide range of color, and a varied habit of growth from two to twenty feet in a season. It is frequently cultivated as a conservatory climber, but is not hardy at the north. The dwarf varieties make handsome bushes for beds.

The Bourbon Rose (Rosa Indica Borbonica) was introduced into Europe from the Isle of Bourbon. It was obtained by crossing the China Rose with some other kind of eastern origin, naturalized on that island. They are a superb class, though not very fragrant, enduring the greatest heat of our summers; are more hardy than either the Teas or Bengals, and possess a wide range of color.

The Hybrid Perpetual Rose.—This class was obtained by hybridizing the Province and Damask varieties with the China or Everblooming. The name Perpetual, however, is almost a misnomer, for unless fed highly and kept growing, removing all seed vessels, and occasionally shortening some of the shoots, they will give but a scanty bloom. They are hardy and unsurpassed in form, color, or perfume.

The Bengal Daily or Chinese Rose (Rosa Indica).—This rose was introduced to our gardens in 1718. Its free flowering qualities have made it a favorite from the cottage to the palace.

In this class will be found a great variety in color, blooming from early in the season until severe frost. They are admirable for beds, or as a pot rose for the window garden, and though less fragrant than Tea Roses, are not less abundant in bloom.

The Miniature Rose (Rosa Lawrenciana).—This is a dwarf rose, as its name implies, rarely exceeding a foot in height. It is a most unique ornament for the window or garden, flowering abundantly in pots or in beds on the lawn, or as an edging for beds of roses of larger growth.

Cultivation:—The rose delight in a deep loam well drained and manured, although it may be seen very thrifty in soils widely dissimilar; still it is better that the soil be modified according to kind. We should not use so adhesive a soil for a Tea or Bourbon Rose as for more ordinary kinds. As a general rule roses should be planted in masses, in situations fully exposed to the sun, where they produce a fine effect. The rose will be in its prime the third or fourth year after planting, after which it will not flower so well. A new place should then be prepared for a new planting.

In planting select such as are young and healthy; old plants should be rejected. Mulching will be found to be indispensable in summer. It prevents moisture evaporating too rapidly by the formation of a stratum of air in repose, keeping the soil cool and in proper condition around the roots. If you have not provided a deep soil, watering will be necessary in dry weather. This should be done thoroughly rather than frequently. But deep culture should be provided, for it is the deeper series of fibres situated in a proper medium that sustains a succession of flowers in spite of heat and drought. These beautiful flowers amply repay any attention given them, and although in some senses they are independent of careful culture, producing flowers however much they may be neglected, yet it is astonishing what a difference may be produced in them by a scientific and tasteful application of human skill.

Next to soil and situation pruning is of most importance. It requires an intimate knowledge of each class of roses to enable one to prune them properly. As a general rule most roses will flower better if closely pruned in spring, others, such as the moss and yellow roses, should not be so severely pruned. Climbers

should have the old wood cut clean away, making room for the young and vigorous shoots. At time of planting prune rather closely, leaving two or three buds on the strongest shoots, and cutting away all weak ones. Every year a liberal quantity of manure should be packed in around the roots, and during summer applications of liquid manure will be found to be beneficial. Judicious pruning reduces the rampant growth and increases the energy of those of more delicate constitution, relieving from superfluous shoots and useless wood, and reducing the whole contour to a sturdy and compact form.

The propagation of the rose in this country is usually by cuttings, either of young or ripened wood. By the former method cuttings may be inserted at any time; by the latter the operation may be performed between October and January. Layering may also be practiced with good results during the month of August. The shoots should be strong, and the leaves give no evidence of dropping. The cut should be made on the upper side, and not on the under, as is recommended in the books. Bind down the shoots, and cover with rich soil. Tender roses require protection in winter, either by potting the plants and placing them in cold pits, or the tops may be packed with dry leaves, covering all with a box, so as to keep the leaves dry and prevent their blowing away.

This latter method is of course only practical where a few roses are kept and it is desired to have handsome specimens. Roses protected in this manner have a great advantage over those taken up every fall and replanted in spring, in that the roots being undisturbed, a free, unchecked, and natural growth is at once assured. As many people are now building cheap glass structures in which to grow exotic grapes, they afford an excellent place in which to winter tender roses. Nothing tends more to exhaust the vitality of the rose than allowing the seed to mature; consequently the seed vessels should be pinched off; it not only promotes the growth, but increases the season of bloom.

The most troublesome insect in the rose garden is the Rose Slug (*Selandria Rose*), of which there are two varieties.—one of which is destructive to the lower side of the leaf, the other eats it entire. Another enemy is the Rose Bug (*Macrodactylis Subspinosus*), so named because of its preference for the blossoms of the rose. It is, however, very destructive to some other plants. The best antidote to all insect life is preventive. White *hellebore*, either in powder or solution, is death to these insects. It is best applied by dissolving one table spoonfull of *hellebore* in two gallons of boiling water; apply when cool. One or two applications will be sufficient for the season.

In purchasing plants avoid such as have been coddled by being raised and grown in a strong heat while young. Such plants have the germs of disease and early death sown in them by the forcing process, and if they live, remain stationary a long time, seldom giving satisfaction.

JAMES CASSIDY.

THE APIARY.

WINTERING BEES.

THE PRIZE ESSAY READ BEFORE THE NATIONAL BEE-KEEPERS' CONVENTION AT
PHILADELPHIA, PA., OCTOBER 26, 1876.

Few manual labor pursuits possess the fascination or the financial possibilities that may be justly claimed for apiculture. Remove from this the uncertainties with which the late disastrous winters have served to invest it, and it would stand paramount. Hence it is that this subject of wintering bees is of leading importance, and well deserves the earnest thought, careful study, and accurate experiments of the most able of our practical and scientific men.

In a brief consideration of this important theme, let us examine the physiological facts that bear upon it, glean what we may from the fields of experience, and then see if we may come to any conclusions that appear to be justified by the premises.

It is a physiological fact, without exception among animals, that exercise and the power to generate any considerable amount of heat, requires food and necessitates excretion. It is further true that bees, unlike most insects, are like the higher animals, more or less active the winter through, and can only subsist in a temperature independent of the surrounding media, which is maintained by the bees themselves. If the temperature of the surrounding media is neither extremely high nor extremely low, that is if it keeps at the proper uniform standard, the bees, like higher animals in like condition, will exercise little, will take little food—and by food I mean all nourishment, including oxygen—and will consequently excrete very little, either in form of feces, or by evaporation from the general surface of the body. It is further true that bees, from the fact of their confined situation in winter, cannot excrete excessively without rendering the atmosphere about them unwholesome and even poisonous; this with undue fecal deposits is sure to bring disease. Hence our first truth: successful wintering demands a uniform temperature.

It has already been stated that bees take food during the winter. Whatever the temperature, some food is consumed. Now it is a physiological fact, unquestioned, that good health among all animals demands proper food. As tainted water often brings dysentery and death to hosts of our own unfortunate brothers, so no less will unwholesome food bring disaster to the denizens of the hive. Hence our second truth: to winter safely, our bees require sufficient stores of good wholesome food.

The student of bees need not be told that the worker bee is possessed of no

great longevity. A worker bee three months a laborer is aged and infirm. It is equally patent that winter is the trying period when the "struggle for life" is sure to come to the bees. Does the leader of a trying campaign call to his aid men feeble with years, whose very age makes them topple and fall under the first burden that is laid upon them? No more should the apiarist expect a colony of old bees to be able to stand the trying ordeal of winter, and build up the depleted household to its wonted strength as spring draws on. Therefore we announce our third truth: bees to winter well, must be strong in youthful vitality as well as in numbers.

It has been stated that excretion is a certain result with bees, even in winter; though this will be slight if the temperature be kept just right. To prevent any ill-effects from an accumulation of these elements of destructive assimilation—water and noisome gases—there should be absorbents above the bees, which would not only absorb the moisture but permit the gases to escape, without exposing the bees by a too rapid removal of heat. Our fourth and last truth then: covering the bees with some absorbing material that is at the same time a poor conductor of heat, is conducive to safe wintering.

Now let us see if recent experience has sustained the above conclusions: for if we are sure of our diagnosis we may feel confident as to practical results.

And first as to temperature. It is a significant fact that those winters which have been most disastrous have also been characterized by extreme cold. I am well aware that many colonies of bees perished during these winters that were independent of the cold. But we must remember that this is a complex subject, and that several elements must be considered in solving the problem. And just here I would call attention to the fact that many apiarists, because of the complexity of this subject, and because it would not yield a simple solution, have become alarmed and cried epidemic. It is not necessary to show that cold is the only cause of disaster. I myself lost heavily the first cold winter, with my bees wholly protected against the extreme cold. Yet the reason of the mortality was not difficult to find, as will appear in the sequel. During the terrible winter of 1874-5, terrible alike for cold and for bee-mortality, I supervised the preparation of four apiaries for winter. With my own I tried the experiment of putting them into a new depository which I supposed to be frost proof; but during the unprecedented cold of February, when the thermometer on three occasions went 25° below, and once to 32 below zero; the mercury in my building even went below zero, near which it remained for a number of days. My bees all died. All three of my neighbors, two of whose bees were not so strong as mine, whose bees I had prepared in precisely the same manner, except that they were amply protected against the severe cold, passed the winter with no loss.

During the winter of 1872-3 I also prepared my own bees and those of one of my neighbors for winter. These were amply protected, and came through not only without loss but in excellent condition. So far as I know there were no other bees saved anywhere in the town.

My friend Mr. John Davis, of Delhi, has passed all these winters without loss. He protects his bees, never allowing the temperature of his cellar to fall below freezing point.

That able and far seeing apiarist, the lamented M. Quinby, was one of the first to discover this fact; and here as elsewhere he gave advice, that if heeded would have saved great loss and sore disappointment.

I could give much further evidence of the same kind were it required, but

will only say that though I have studied this subject widely and closely, I have yet to observe aught to invalidate the above stated truth.

We next come to view the second factor in safe wintering: sufficient and wholesome food. That bees need some food to stand between them and starvation, experience has too often proved. This fact will receive universal credence. But that the stores are not always of a suitable character though just as true, is not well understood.

The autumn of 1871—the year of Chicago's great calamity—will ever be memorable throughout our northern States for its unparalleled drouth. Every green thing, flowers included, shriveled for want of moisture. Thus bees were cut off from their usual source of honey. During the same autumn there were an unusual number of plant and bark lice. The willows, the beeches, the tulip trees, in fact almost every plant supported some species of these families of vegetable parasites. The same excessive drought that blasted the flowers favored the development of these withering insects. The bees, ever eager for sweets, not able to sip from the flowers, gathered largely from these lice, which secreted a sweetish substance from their bodies. Many observed, and I among the rest, a large amount of uncapped honey or stores as they prepared their colonies for winter, and wondered at so unusual an occurrence. During the succeeding winter I experienced my only other case of disaster in wintering. To be sure the winter was cold, but my bees were so protected that they felt it not. My twelve colonies went into winter quarters quite strong and in fine condition every way, except that they were provisioned with this uncapped honey, which I supposed would be fully capped, as there was yet abundance of time after I last looked at them in the fall. In February I examined my bees and to my great surprise, for this was my first misfortune with bees, I found eight of the colonies dead. I was no less surprised to find the honey still uncapped. Bees usually gather honey and leave it to be capped when the condition becomes such as to warrant it. This never reached the condition of good honey. May this not be why it never was capped? I tasted of the honey and found it nauseating in the extreme. I believe that this unsuitable food killed my bees. What makes this seem more probable is the fact that one of the four remaining colonies, all of which seemed equally diseased and feeble, from which I took all the stores, replacing them with good capped honey, stored early the previous season, commenced at once to revive, recovered entirely before spring, and gave a net return of over seventy dollars the succeeding season. The remaining colonies, which were cleansed of dead bees, permitted to fly, but which retained their unwholesome stores, soon perished. The following spring I examined several defunct apiaries in this vicinity, and in every case found the same condition of ill-tasting stores. Those who, like Mr. Davis, saw that their bees had only good capped stores and were well protected did not suffer loss. Hence I think I am safe in affirming that in this region, one of the chief factors which wrought the disease of that year was unsuitable food.

Our third truth, that colonies should be plenteous in young bees as winter draws on, is so compatible with reason that it seems hardly necessary to substantiate it with experiments. In my own experience I have only negative evidence. I have always kept my bees breeding well into autumn, and have never suffered by spring dwindling. Mr. Davis reduces the number of his colonies each autumn by destroying the old bees and uniting the young ones, till each colony is strong, and has never suffered loss. A year ago I thought I would put this matter to a test in a small way. In one hive I permitted no brood to

hatch after the middle of August, but kept the colony strong in old bees. The colony was permitted to fly once during the winter, seemed in good condition, yet showed more dead bees than any other colony. They lived till spring, when they died, young queen and all, though the queen lived till after every bee had shuffled off this mortal coil. I hence affirm that whenever there is no fall storing so that brood rearing stops in August, whenever the queen becomes impotent so that she fails to deposit eggs to any considerable number, or whenever the autumn honey yield is so bountiful that the queen has no opportunity to deposit, as has been the case here the present autumn, then the careless apiarist is in imminent danger of experiencing spring dwindling.

All experience shows the importance of absorbents above the bees, for what observing apiarist has failed to notice the moisture in his hives in winter which often induces fungus growth, as seen in mouldy comb; or in cold winters has failed to note the moisture changed to frost, which in severe weather approximates too near the cluster, often keeping them from the needed stores. Of the evil effects of confined gases I know nothing from my own experiments, and know of only one man who has experimented carefully in this direction—my friend Mr. Townley, of Jackson county, Michigan. His experiments as given to me confirm the truth enunciated above. I presume in most cases these gases find means of exit and are harmless.

What are the requisites to safe wintering?

1st. The colonies must be kept in a uniform temperature, which should never vary beyond the minimum temperature of 35° or the maximum of 45° . This may be safely secured by placing them in a dry, dark, well-ventilated cellar, which shall maintain the required temperature, or in a house with double walls, enclosing a space wide enough when filled in with sawdust to be frost proof, even during the severest winter, and so arranged as to be ventilated without admitting the light. The same results may be gained with the colonies on their summer stands, if we but place boxes or boards around and above the hives, leaving a space of a foot or more to be filled in with sawdust, chaff, straw, or shavings, all of which I have used with perfect success. In this case it may be well to use a tube or portico to the hive so that the bees may fly out should the weather be warm for so long a time that the bees would become overheated and uneasy. The same object may be gained by leaving the front of the hive, which should face to the east, unprotected. Could we be sure of sufficient snow so that our bees could be covered deeply the winter through, we could ask for nothing better. I never had my bees do better than when thus protected, during the disastrous winter of '72-3, when my bees, and those of a neighbor which I arranged, were all that survived in the whole neighborhood.

2d. The bees should not go into winter quarters without at least thirty pounds of good capped honey. If the combs contain uncapped honey it should be extracted. If the apiarist has not the requisite amount of suitable honey it will do equally well to supplement his supply by feeding good, thick honey which has been extracted early in the season, or if that be not at his command a syrup made of coffee A sugar of the consistency of honey, or just so that it will not crystallize upon cooling, will answer equally well. Perhaps the most convenient method to feed this is to put it in a bag made of drilling which is tacked to a strip of wood just like the top bar of a frame, except that it is two inches wide and has a hole cut in the center one inch wide and two inches long. Hang this between the frames and the end of the hive, then pour in the honey or syrup. The bees will sip it up and store it away as it oozes through the feeder. Of

course the bag should not reach quite to the bottom or sides of the hive. The feeding should be done as early as the last of September, so that the bees may have time to cap the cells before the weather is too cold.

3d. Any impotent queens or any not first-class, should be superseded early in the season. If the bees stop gathering in August, feed sparingly, as described above. One-half pound daily will suffice. Again, if storing be very rapid in August and September, as it is likely to be where fall bloom is plenty, the honey must be extracted, so that the queen may have a chance to deposit eggs. Brood rearing would have entirely ceased in all my colonies the present season as early as August had I omitted to extract. As it is there is brood in nearly all of them to-day—October 18th. Those apiarists about here who have not extracted may look for spring dwindling the coming spring.

4th. Immediately above the bees there should be placed a quilt made of good factory, and still above this, if the hives permit, as in most cases they will, there should be placed a factory bag filled loosely with chaff. This may be from six to twelve inches in thickness.

So sure am I that the above methods will succeed without fail, that I sell my bees in autumn, warranting them to winter if I can oversee the preparation.

A. J. COOK.

THE COMPOSITION OF HONEY.

READ BEFORE THE MICHIGAN CONVENTION, HELD AT LANSING, MARCH, 1877.

Honey is one of the oldest things under the sun. At one time it was probably the only form of sugar known, and to-day is one of our most delicious articles of food. Does it not seem strange, then, that in this scientific age so little is known of its real composition, or the changes it undergoes?

Honey is composed of grape and cane sugar, together with water, acid, and waxy matters. If honey be burned completely, a grayish colored ash remains, which amounts to about fifteen per cent of the original honey. In this ash I succeeded in obtaining reactions for silica, lime, and iron. There is also a small quantity of potash and phosphoric acid in honey. To estimate the quantity of these present, I took two portions of "cap" honey, free from pollen and wax, and burned them to a coal-like mass. In one, I extracted the potash with muriatic acid, and in the other phosphoric acid with nitric acid, and estimated them in the usual manner. The following are the amounts obtained: Potash, .06 per cent; phosphoric acid, .08 per cent. These substances would naturally be present in honey, as they are found in soils, and circulate in the juices of plants.

There are many things connected with honey, about which at the present time but little is known. The following are a few:

1. Has honey a definite composition? Is there any difference between the relative amount of sugar in honey made from buckwheat, basswood, clover, golden-rod, brown sugar, etc., or between the relative amounts of cane and grape sugar? Probably this question can only be answered by comparing the analysis of different kinds of honey.

2. Does the bee add anything to nectar in changing it into honey? On this point there is wide difference of opinion. But I know of no experiments having been tried to settle the matter. Perfectly pure honey, that has been dried completely, contains about 1 per cent of nitrogen. Does the bee supply this nitrogenous matter? To decide this, I gathered some nectar from flowers in the Agricultural College greenhouse (from the azalia, rhododendron, and fuchsia, but principally from the last), and carefully tested it for nitrogen. The result of my experiments is that nectar *does* contain traces of nitrogen. Therefore, the fact that honey contains nitrogen does not prove that it was furnished by the bee. May not this question be decided by feeding bees upon pure white sugar, which contains no nitrogen, and afterwards examining the honey to see if any nitrogenous matter has been added to it?

3. After honey has stood for a certain length of time, a part of the grape sugar crystallizes out, and granulation or candying is the result. The cause of this change is not known. May not the conditions under which granulation occurs be determined by a series of experiments, by keeping honey at different temperatures, etc.?

Answers to these questions may not advance the market value of honey a particle, but we shall enjoy the satisfaction of knowing the truth of the whole matter.

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SHALL FARMERS KEEP BEES?

READ BEFORE THE MICHIGAN ASSOCIATION, HELD AT LANSING, MARCH, 1877.

It is much to be regretted that there is any necessity for the discussion of this question. It is unfortunate that there still remains any doubt upon a question of so much practical value to the agriculturists of this country. In its consideration I shall briefly endeavor to answer some of the reasons which are given by farmers why they do not keep bees.

The objections raised may be said to be these: First, a lack of time; second, fear of being stung; and, third, a lack of information in management.

First—As to a lack of time. A few pertinent questions as to the average farmer develops the fact that the principal object sought in tilling the soil is gain. That this principal has a governing influence in determining the kind of crops raised and the system of management; that wheat is sown because the crop pays better than oats, that hops pay better than buckwheat; that the raising of cattle pays better than mules. The question is then a mere question of profit. And if \$100 invested in bees will give a larger profit than the same amount invested in most branches of agriculture, then the first objection will be answered.

A farmer located in any average agricultural district in Michigan can purchase ten hives of bees (and if not in movable frame hives can transfer them to such), an extractor, honey knives, bee hat, and other necessary appliances at a total cost of not over \$100. The time necessary to care for them each season

would not exceed in the aggregate 20 days, at say \$1.50 per day, being \$30. Now, what will he receive in return? Judging from my own experience and that of others who have practically applied the improvements in bee-culture made in the last 20 years, he will obtain not less than an average of 75 pounds of surplus per hive, making 750 pounds, worth at least 12½ cents per pound, or \$93.75; deducting the value of the labor, and he has \$63.75 as a profit on the original investment of \$100,—an income of 63¾ per cent. Aside from this in most years there would be an increase in stocks which would offset any losses which might be suffered in wintering.

But is not the above estimate too high? Let us see. During the past year, —and it was not above an average honey season in my section, linn or bass-wood yielding but little honey,—from 29 hives, 20 of these being in box hives, I obtained 2,000 pounds of honey and 25 new colonies. In one season previous, being desirous of ascertaining just what a number of colonies would produce if attended to carefully, and increase of colonies prevented, 17 hives averaged 125 pounds of extracted honey each. I am satisfied the estimate is not too high, but the profits might be often larger in extra seasons. Of course my estimates are made on the supposition that the system of management is in conformity with the improved methods, and not on the old plan. I think I need not waste any time in presenting evidence that the profits above mentioned are larger than those secured in most branches of agriculture, and shall assume that the first objection is answered.

The second objection,—the fear of being stung,—is certainly a very *feeling* objection; and a warm reception by a score or more hybrids, without protection, would put a large majority of persons to flight, but fortunately such cases are rare, and with the use of the bee hat all danger is avoided. Occasionally there is a person who is so seriously affected by the virus of a bee that it would be imprudent for him to have anything to do with them; but we find only one such person in a thousand. Many persons care little for the sting of a bee, scarcely more than for the bite of a mosquito.

The fear of being stung is a small objection, and the pain and inconvenience is one of the unpleasant features of the business, and what business has not its disagreeable points? Crops fail, all kinds of stock are subject to disease and accident; pear trees are struck with the blight, the curculio destroys the plums, even the dog runs mad.

The third objection,—a lack of knowledge of how to manage them,—is the most serious one. The first two are merely used to avoid giving the true reason which would involve an acknowledgment of ignorance, which, unfortunately, we oftentimes hesitate to make. It is a fact not to be disguised that the successful keeping of bees requires careful study and prompt and timely care, as much perhaps as any branch of agriculture; but happily the bee-keepers of the United States have been a public-spirited and unselfish class, and through the medium of our bee journals, pamphlets, and books, have placed within easy reach of all people a full and complete knowledge of the vast improvements made in the management of the apiary during the last ten years. And what more pleasant way can the farmer employ the long winter evenings than in making himself, his wife, sons and daughters familiar with “Langstroth on the Honey Bee,” “The Mysteries, by Quinby,” and the equally valuable and still later information contained in the journals of to-day. In this manner the natural history of the bee and the theoretical management of the hive can be pleasantly obtained. And not only this, but the boys will be influenced to

spend their earnings at home instead of at the village store or saloon; and another avenue of enjoyment and profit will be opened for our farmers and their sons and daughters.

Now, shall farmers keep bees? While the majority of them do not, and probably will not, yet I unhesitatingly reply that they should. It is a true saying that "The man who loves his bees, loves his home." And if our farmers could be induced to make themselves familiar with the wonders of the hive, I am certain that an enthusiasm would be aroused which would give us many skilled entomologists, a new interest would attach to the home circle, vice would be avoided, and a new element of profit would be introduced in agriculture.

A. B. CHENEY.

A WOMAN'S EXPERIENCE.

READ BEFORE THE MICHIGAN ASSOCIATION, HELD AT LANSING, MARCH, 1877.

Some years ago there seemed little else for the average woman to do, in the way of self-support, aside from music, teaching, sewing, and household employments, and the few who ventured beyond these were considered at least "strong-minded," very likely "masculine." The question of woman's rights is no longer prominently before the public, but whatever one's views may be, or may have been upon the subject, its agitation has undoubtedly done good, leading woman to consider her own abilities, and awakening her to the realization that whatever other rights were denied her, there were fields of remunerative labor open to her hitherto unrecognized. These, considering the barriers of custom, she has not been slow to occupy; but there are still others given up to the monopoly of men to which she is well adapted, and which in the progress of woman's or human rights must inevitably be shared with her.

Bee-keeping for women is of comparatively recent date, and judging from the interest manifested, is attracting a degree of attention hitherto unknown. "Will it pay?" is a practical question often asked of me, but one to which I can reply with no more assurance than if it pertained to the keeping of a boarding-house. So much depends upon knowledge of the business and management, that in either case it may or may not be a success. But I can say, that having tried both, I give bee-keeping the preference as more profitable, healthful, independent, and enjoyable.

Like other occupations, it has its drawbacks. The apiarist may lose his bees in various ways, or the flowers may fail in their contribution of honey; but the liabilities are no greater than that the farmer may fail of success through drought or flood, or the boarding-house keeper through unpaid boarders' bills or wastefulness of servants. Perseverance and general good management will in time overcome such occasional obstacles. Evidently we can point to no sure way of success, unless it be to that of the Frenchman who said "the way to be successful is to succeed." The

PROFITS OF THE APIARY

seem to me as sure as those of most employments for women, and much

greater. I judge so from observation and from my own experience, which I have been requested to give.

Three years ago last fall I bought two colonies of Italian bees of Prof. Cook, and under his instructions wintered them out-of-doors successfully. The year following they increased to five large colonies, and my account for the first year is as follows:

Spring of 1874—Dr.

To 2 colonies of Italian bees @ \$12.....	\$24 00
interest on the same at 10 per cent.....	2 40
3 hives complete @ \$2.50.....	7 50
Total	\$33 90

Fall of 1874—Cr.

By 5 colonies of bees @ \$10.....	\$50 00
215 lbs. comb honey @ 25c.....	53 75
185 lbs. extracted honey @ 18c.....	33 30
Total Cr.....	\$137 05
Total Dr.....	33 90
Balance of credit.....	\$103 15

The second winter the five colonies were kept on their summer stands and came out in good order. These were increased to 17 colonies, and the account for the second year reads thus:

Spring of 1875—Dr.

To 5 colonies of bees @ \$10.....	\$50 00
interest on the same.....	5 00
8 hives.....	20 00
sugar for spring feed.....	2 00
Extractor	8 00
Quinby Smoker.....	1 50
Total	\$86 50

Fall of 1875—Cr.

By 420 lbs. comb honey @ 25c.....	\$105 00
504 lbs. extracted honey @ 18c.....	90 72
17 colonies of bees @ \$10.....	170 00
80 empty combs @ 25c. each.....	20 00
Total Cr.....	\$385 72
Total Dr.....	86 50
Balance in favor of Cr.....	\$299 22

The third winter all were kept in a room in the house cellar specially prepared for them, but not in the best condition when they were put in. It was plastered all over, but too late to become perfectly dry. As a consequence there were some mouldy combs, and the colonies were all somewhat depleted, though none were wholly lost. In the early spring, through negligence, one

colony starved. I sold another, and by uniting others reduced the number from 17 to 13. With these I began last summer my third year. Not wishing to increase the number because of inability to properly care for them, I kept them back as much as possible, making very large colonies. In the fall they numbered 18, and my account for the third year is as follows:

Spring of 1876—Dr.

To 13 colonies of bees @ \$10.....	\$130 00
interest on the same.....	13 00
7 hives @ \$2.....	14 00
honey for feed.....	4 00
loss in wintering—3 colonies.....	30 00
Use of one acre of land for white clover.....	10 00
Total	\$201 00

Fall of 1876—Cr.

By 903 lbs. extracted honey @ 16c.....	\$144 48
550 lbs. comb honey @ 22c.....	121 00
125 empty combs @ 25c.....	31 25
1 colony sold.....	8 00
18 colonies on hand @ \$8.....	144 08
Total Cr.....	\$448 00
Total Dr.....	201 00

Balance in favor of Cr.....\$ 247 73

I began bee-keeping with very little knowledge of bees,—so little, that when the first swarm issued and were circling in the air, I thought, as I remarked, that they were “out on a frolic.” But when they clustered on the limb of a tree, preparatory to flight, I comprehended that

THEY “MEANT BUSINESS.”

I am asked how I can endure working out-of-doors in the heat of summer. I reply that I find it more endurable than working over a cook-stove in-doors, and much pleasanter and more conducive to health. By beginning in the early spring when the weather was cool and the work light, I became gradually accustomed to out-door labor, and by mid-summer found myself as well able to endure the heat of the sun as my husband, who has nearly all his life been accustomed to it. Previously, to attend an open-air picnic was to return with a headache. I have great faith in pure air and sunshine as curative agencies, and believe that many of our delicate and invalid ladies would find renewed vigor of body and mind in the labors and recreations of the apiary. The

DREAD OF BEING STUNG

is an objection I frequently hear urged. I have no fancy for it myself, but as yet have found it no serious objection, nor the slightest damper to my enthusiasm. I am not one of the fortunate ones whom bees *never* sting; therefore, when from scarcity of honey, or from any other cause, they are cross, I protect myself with veil and gloves, and am so seldom stung, considering the time I spend among the bees, that I never think of it as an objection to the business.

Women often complain that there is no inspiration in their work; that it holds the attention but does not prompt to study or investigation, thus affording little opportunity for mental improvement. In this respect bee-keeping is in marked contrast. A worker in the apiary is also a student, and is constantly meeting with surprises, and learning something new and intensely interesting. In Europe it is said to be considered an intellectual pursuit.

As I have said, I knew very little of bees when I first undertook the care of them. I supposed there were rules to be rigidly adhered to, any deviation from which would result in disaster. I therefore, at every step, anxiously consulted Langstroth, Quinby, or Prof. Cook, as was most proper for a novice to do, and to them am indebted for whatever of success I have achieved; but have since learned that in bee-keeping, as in other matters, there are many ways of accomplishing the desired end; consequently, I have sometimes ventured to disobey them all, and thus far without unsatisfactory results. Notwithstanding an acquaintance with the best authorities, there is still opportunity for every one to learn by personal observation and experience.

I but partially agree with those who regard enthusiasm indispensable to success. In the more ordinary vocations many do succeed in comfortably maintaining themselves and families with very little enthusiasm for their work,—often none, and sometimes with even positive dislike. Then bringing the same determination and good sense into use, why not, in a similar degree, succeed in bee-keeping without enthusiasm? I admit its great desirability, but regard it as a possession too uncertain to be relied upon. However, I believe it to be a natural outgrowth of the

STUDY OF NATURE

in almost any department, and that she who interests herself in bees for the sole purpose of making money may gain her object, and also find herself an ardent lover of her occupation.

My own experience in the apiary has been a source of interest and enjoyment far exceeding my anticipation, and it is a matter of regret to me that for a few years I must forego its pleasures as well as profits.

MRS. L. B. BAKER.

RELATIVE MERITS OF ITALIAN AND BLACK BEES.

READ BEFORE THE MICHIGAN CONVENTION HELD AT LANSING, MARCH, 1877.

It was not without some degree of hesitancy that I prepared this paper with the intention of reading it before this convention. It is upon a subject that I consider of paramount importance to all honey producers; and I have reason to believe that every enterprising bee-keeper will in some measure share with me in this opinion.

I hesitated, first, because I am a mere infant in this society, not having been a member until this year, and never before this season having had an opportunity to attend one of its meetings. In the second place, I hesitated because I am aware the conclusions at which I have arrived will clash more or less with

the opinions held by some of my brother bee-keepers. And thirdly, I hesitated somewhat to express my full convictions on the relative merits of Italian and black bees on grounds of self-interest. I have seen with others that there were dollars and cents connected with raising and selling at fancy prices the beautiful golden-banded queens, as also with the sale of full stocks of the highly recommended.

But I have become fully convinced that the great superiority claimed for Italian over black bees is purely visionary and fanciful. My motto is, let the truth come even if it does sear and burn some of the pet theories and lessen the opportunities for swindling the uninitiated and inexperienced ones.

In the agricultural report for 1875 one of our agricultural editors is strongly reprimanded for making the statement that Italians are no better than black bees, and he (the editor) is represented as standing alone on this question. If such was the fact at that time I wish it to be understood in the future that there is at least one more on that side, and I am quite confident from what I know of the feeling that exists among bee-keepers that the time is not far distant when pure black bees will be in better demand than the beautiful yellow bees are at present.

In the above named agricultural report eleven points of superiority are claimed for Italians, as follows: 1, They have longer tongues or ligulas; 2, They are more active; 3, They work earlier and later; 4, They are better to protect their hives against robbers; 5, They are almost moth-proof; 6, The queens are more prolific; 7, Brood-raising commences earlier; 8, The queens are more easily found; 9, The bees adhere to the combs better; 10, They are far less apt to rob other hives; 11, They are more amiable.

These I think are a fair sample of points of superiority claimed by Italian queen-raisers in general. As the first three points relate to honey-gathering ability, I will group them together and ask the following question, viz.: What advantage is there to be gained by having bees with longer tongues, greater activity, and earlier and later work, if, in fact, they do not gather more honey in the same length of time? My answer to this question you will get from my experience, which I shall relate further on.

On the 4th, 5th, and 10th points I will say that my experience proves to me that no prudent bee-keeper will ever have trouble with robbers or moths. And again, on the 6th point, what does it amount to, even if the queen is more prolific, if in practice the brood chamber does not actually contain more brood? On the 7th point I would say that my experience furnishes no evidence that brood-raising commences earlier with Italians than with blacks that have had the same care. The 8th and 9th points may be considered as one, since the queen is more easily found because the bees adhere to the combs better, and I think that this, together with the claim that the Italians are more amiable, is true; and it leaves the matter in this way: Italians are superior to black bees only in two points—the queens are more easily found and the bees are more amiable, and therefore more easily handled.

I wish now to state in what respects I consider black bees superior to Italians. I will generalize them under four heads, as follows:

1. They are far better to store box honey, far out-doing Italians in quality as well as in storing it in much better shape;
2. They are hardier, will stand the winter better, and are not so liable to be reduced by spring dwindling;
3. They are better comb-builders. They build straighter, make less drone

comb, and are not nearly so apt to connect the frames by small pieces of comb and bits of wax;

4. They are more easily controlled in the practice of artificial swarming, which to every professional bee-keeper is all essential.

I have arrived at these conclusions through experience and very careful observations, and my experience is being confirmed by that of other careful observers. In explanation of my second point, I would say that I am not so certain that black bees winter better so far as the body of winter is concerned, but I am positively sure they came through the spring better; and every practical bee-keeper will agree with me that this is a very important period in wintering bees. Perhaps the dwindling of Italians in spring may be due to flying out when the weather is too cold, thereby becoming chilled and unable to return to the hives. I have had considerable experience with Italian and black bees for the last five years, but have only had an opportunity to give them a fair test during the last two years, which is as follows:

March 25, 1875, I purchased six swarms of bees. They had been taken out of winter quarters only a short time before, and seemed all to be in about the same condition. Of these one colony was pure black bees, three were hybrids, and two were pure Italians. By the last of April there was a marked difference in their condition. The blacks were strong, the hybrids were next in strength, while the Italians were reduced to a mere handful in either colony.

May 1st I sold a swarm to one of my neighbors. I offered him one of the Italians for \$10. After looking them over he wanted the price of my black swarm, and to save it I put on a price of \$25; and even at that price he hesitated somewhat before making a choice of the Italian.

In the spring of 1876 I sold my apiary in Lenawee county, removed to Northville, Wayne county, and formed a partnership with Mr. D. F. Griswold. We immediately purchased sixty colonies of bees, of which thirty-three were pure blacks, and twenty-seven Italians. Again, all seemed to be in about the same condition. The Italians had fine pedigrees. They could be traced back as daughters, granddaughters, sisters, etc., to queens from Dadant, Argo, Novice, etc. It was all very nice to have bees with pedigrees, but it wasn't quite so nice to find the Italians rapidly decreasing from the last of March to the first of May. About the latter date we transferred all our bees, the blacks from the old box hives to hives with movable-frames, the Italians from movable-frames to frames of a different shape. Again we found a decided difference between the condition of blacks and Italians. The blacks averaged much stronger and had a much larger amount of brood than the Italians. But I will pass these things by as of minor importance, and go on to the main point for which all bees are supposed to be kept, viz.: the largest possible amount of pure honey in the most salable shape.

When summer came and the trees were laden with bloom, the meadows carpeted with rich white clover, and each flower well stored with nectar, then it was that I became completely disgusted with Italian bees. Our blacks were getting on in the most satisfactory manner, building and storing a whole section in a single day, while I found it impossible to induce Italians to enter the boxes at all. But instead they were filling the brood chamber below, and, wherever there was any possible space, building small additions of comb; meanwhile they were trying to swarm with the wildest confusion, and swarm they did with but a small amount of bees, and without a single queen cell. Then it was I stocked our nuclei with queen cells from our pure and most prolific blacks,

and whenever I had occasion to introduce queen cells I did so from black stock. The result is that nearly all our increase for last year is black bees.

My father, a close observer, a practical and successful bee-keeper, with many experiments, and with a keen eye to the interests of his apiary, has had similar experience, and has arrived at the same conclusions.

There are those to whom I think Italians might be recommended. To beginners, who are unaccustomed to handling bees, to persons of nervous temperament, to those who are by nature timid, and to gentlemen and ladies who keep bees for pleasure rather than profit, I would recommend pure Italians, the purer the better, for I find the lighter the color the more docile the bee. But to all who mean business, and wish to produce the largest possible amount of salable honey, I would recommend black bees, the queens to be bred from the most prolific mothers, the breeder having always in mind the great law of natural selection, and following the example of our universal mother—nature—permitting only “the survival of the fittest.”

Finally, I do not present these views to raise needless controversy, but rather that the truth may be more fully brought out. The facts that I have set forth have impressed themselves upon my mind, and I believe them to be worthy the attention of all honey-producing bee-keepers. And to the end that we may get at the truth of this matter, I am anxious to coöperate with all apiculturists who are laboring for the highest triumph of apicultural science.

W. L. PORTER.

Northville, Michigan.

[Following this was a very lively discussion. No one present fully concurred with the writer of the paper.]

The president said while Mr. Porter's premises were correct, his conclusions might not be so. While black bees are the best to go into boxes, that is not a conclusive argument in their favor, for honey in boxes is not always as desirable as honey in small frames. Again, the Italian bees may dwindle more rapidly in the spring, owing to their more active habits—qualities really in their favor. But the apiarist should prevent early spring flights and thus remove the difficulty.

An exchange justly remarks: Mr. Dzierzon, the man who stands highest among the great bee-masters of Europe, says, after twenty-five years' experience with Italian bees, that in Germany their importation has greatly increased the returns from the culture of bees, and that he finds them more beautiful, more gentle, more watchful, more prolific, and possessed of greater diligence than the common bees. Again, at a recent bee-keepers' convention held at Breslau,—one of those great and enthusiastic meetings for which the Germans are so celebrated,—the conclusion was reached that in poor seasons the Italian bees show themselves superior to all other races. Besides the common and Italian bees, the German bee-culturists have bred the Cyprians, the Dalmatians, the Smyrnians, the Herzegovinians, the Egyptians, and the Carnolian, Krainer, and heath bees.—ED. BEE JOURNAL.]

FULL LIST

OF SPECIMENS OF

FOREST PRODUCTS OF MICHIGAN

SENT TO THE CENTENNIAL EXHIBITION BY THE MICHIGAN STATE
AGRICULTURAL COLLEGE.

[THE FOLLOWING LIST IS REFERRED TO ON PAGE 102.]

LIST OF CENTENNIAL SPECIMENS.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
1	<i>Magnolia acuminata</i>	Cucumber Tree.	Board 31x73 in.	Birmingham	John N. Heith.
2	"	"	Block 6x6 in.	Lansing	Agricultural College.
3	<i>*Liriodendron tulipifera</i>	White-wood	Board 4x10 in.	Grand Rapids	Phoenix Manuf'g Co.
4	"	"	"	Lansing	Agricultural College.
5	"	"	"	"	"
6	"	"	"	"	"
7	"	"	"	"	"
8	"	"	Seeds	"	"
9	"	"	Board 8x16 in.	Grand Rapids	Nelson, Matter & Co.
10	"	"	"	"	"
11	"	"	"	"	"
12	"	"	"	"	"
12a	"	"	"	"	"
12b	"	"	"	"	"
12c	"	"	"	"	"
13	<i>Asimina triloba</i>	Pawpaw	Block 41 $\frac{1}{2}$ x6 in.	Paw Paw	Geo. E. Breck.
14	"	"	Block 21 $\frac{2}{3}$ x6 in.	Grand Ledge	Agricultural College.
15	"	"	Seeds	Cassopolis	Warren W. Reynolds.
16	"	"	Board 3x10 in.	Paw Paw	Agricultural College.
17	"	"	"	"	"
18	"	"	"	"	"
19	<i>Menispermum Canadense</i>	Moon-seed	6-in. by $\frac{1}{2}$ -in. vine	Lansing	"
20	<i>Hypericum</i>	St. John's wort.	"	"	"
21	"	"	"	"	"
22	"	"	"	"	"
23	"	"	"	"	"
24	"	"	"	"	"
25	"	"	"	"	"
26	<i>Tilia Americana</i>	Bass-wood	Cross section 20 in.	Lansing	Agricultural College.
27	"	"	6x6 in. block	"	"
28	"	"	4x10 in. board	Grand Rapids	Phoenix Manuf'g Co.
29	"	"	Board 8x16 in.	Saginaw City	D. Hardin & Co.
30	"	"	Seeds	Lansing	Agricultural College.
31	"	"	Board 8x16 in.	"	A. A. Willour.
32	"	"	"	Grand Rapids	Nelson, Matter & Co.

33	<i>Tilia Americana</i>	Bass-wood.....	Board 8x16 in.....	Grand Rapids.....	Nelson, Matter & Co., " "
34	" "	" "	" "	" "	" "
35	<i>Zanthoxylum Americana</i>	Prickly-ash.....	Block 6x4½ in.....	South Lyons.....	J. J. McWharton, Agricultural College.
36	" "	" "	Board 4x10 in.....	" "	" "
37	" "	" "	Board 2x10 in.....	" "	" "
38	" "	" "	" "	" "	" "
39	" "	" "	" "	" "	" "
40	" "	" "	" "	" "	" "
41	" "	" "	" "	" "	" "
42	" "	" "	" "	" "	" "
43	<i>Ptelea trifoliata</i>	Hop-tree.....	Block 6x3½ in.....	Lansing.....	" "
44	" "	" "	Block 3¼x6 in.....	Paw Paw.....	Geo. E. Breck, Agricultural College.
45	" "	" "	Board 2½x10 in.....	" "	" "
46	" "	" "	" "	" "	" "
47	" "	" "	" "	" "	" "
48	<i>Rhus typhina</i>	Stag-horn Sumac.....	Seeds.....	Lansing.....	" "
49	" "	" "	6x5 inches block.....	" "	" "
50	" "	" "	" "	Paw Paw.....	" "
51	" "	" "	Board 4x10 in.....	" "	" "
52	" "	" "	" "	" "	" "
53	" "	" "	" "	" "	" "
54	" "	" "	" "	" "	" "
55	" "	" "	" "	" "	" "
56	" "	" "	" "	" "	" "
57	<i>Rhus glabra</i>	Smooth Sumac.....	Cross section 10½ in.....	Locke, Ingham Co.....	H. A. Atkins, Agricultural College.
58	" "	" "	Board 4x10 in.....	" "	" "
58 a	" "	" "	" "	" "	" "
59	" "	" "	" "	" "	" "
59 a	" "	" "	" "	" "	" "
60	" "	" "	" "	" "	" "
60 a	" "	" "	" "	" "	" "
61	" "	" "	" "	" "	" "
61 a	" "	" "	" "	" "	" "
62	" "	" "	" "	" "	" "
63	" "	" "	" "	" "	" "
64	<i>Rhus copallina</i>	Dwarf Sumac.....	Block 1¼x6 in.....	Jackson.....	" "
65	" "	" "	" "	" "	" "
66	" "	" "	" "	" "	" "
67	" "	" "	" "	" "	" "

* From a tree which cut 5,600 feet.

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
68	<i>Rhus copallina</i>	Dwarf Sumac.	Block 1 $\frac{3}{4}$ x6 in.	Lansing.....	Agricultural College.
69	<i>Rhus venenata</i>	Poison Sumac.	Board 1 $\frac{3}{4}$ x10 in.	"	"
70	"	"	"	"	"
71	"	"	"	"	"
72	"	"	"	"	"
73	"	"	"	"	"
74	<i>Rhus toxicodendron</i>	Poison Ivy	Block 6x2 in.	Lansing.....	Agricultural College.
75	"	"	Board 2x10 in.	"	"
76	"	"	"	"	"
77	"	"	"	"	"
78	"	"	"	"	"
79	"	Poison Oak.	"	"	"
80	"	"	"	"	"
81	<i>Rhus aromatica</i>	Fragrant Sumac.	Block 6x8 $\frac{3}{8}$ in.	Point Crystal	C. F. Wheeler.
82	<i>Vitis</i>	Grape-vine	Cross section 5 $\frac{3}{4}$	Birmingham	S. Alexander.
83	"	"	Block 5 $\frac{3}{4}$ x6 in.	"	"
84	"	"	"	"	"
85	"	"	"	"	"
86	"	"	"	"	"
87	"	"	"	"	"
88	<i>Ampelopsis quinquefolia</i>	Virginia creeper	Block 18x9 in.	Raisinville	Atkinson Bros.
89	"	"	Cross section 9 in.	"	"
90	"	"	Block 6x1 $\frac{1}{2}$ in.	Lansing	Agricultural College.
91	"	"	Block 6x1 $\frac{1}{4}$ in.	Hudson	A. H. Seeley.
92	"	"	"	"	"
93	"	"	"	"	"
94	"	"	"	"	"
95	<i>Rhamnus alatifolius</i>	"	Block 6x1 $\frac{1}{4}$ in.	Lansing	Agricultural College.
96	"	"	"	"	"
97	"	"	"	"	"
98	"	"	"	"	"
99	"	"	"	"	"
100	"	"	"	"	"
101	<i>Ceanothus Americanus</i>	New Jersey tea, red-root.	Irregular block 6 in.	Sanford	Agricultural College.
102	"	"	"	"	"
103	<i>Ceanothus ovalis</i>	"	"	"	"
104	<i>Celastrus scandens</i>	Bitter sweet, wax work	Block 6x2 $\frac{1}{2}$ in.	Ludington	Agricultural College.

105	<i>Celastrus scandens</i>	Bitter sweet, wax work..	Block 2x24 in.	Ludington	Agricultural College.
106	"	"	Board 2x10 in.	"	"
107	"	"	"	"	"
108	"	"	"	"	"
109	<i>Euonymus atropurpureus</i>	Burning-bush, Wahoo	Block 6x3 in.	Lansing	Agricultural College.
110	"	"	Board 2x10 in.	"	"
111	"	"	"	"	"
112	"	"	Seeds.	"	"
113	"	"	"	"	"
114	"	"	"	"	"
115	"	"	"	"	"
116	<i>Euonymus Americanus var, obovatus</i>	Strawberry bush.	"	"	"
117	<i>Staphylea trifolia</i>	Bladder nut.	Block 2x6 in.	Lansing	Agricultural College.
118	"	"	Board 1 $\frac{1}{4}$ x10 in.	"	"
119	"	"	"	"	"
120	"	"	Seeds.	"	"
121	"	"	"	"	"
122	<i>Aesculus glabra</i>	Fetid or Ohio Buckeye.	Cross section 10 in.	Monroe	C. E. Sumner.
123	"	"	Seeds.	"	"
124	"	"	Two boards 8x16 in.	"	Agricultural College.
125	"	"	Board 4x10 in.	"	"
126	"	"	"	"	"
127	"	"	"	"	"
128	"	"	"	"	"
129	<i>Acer Pennsylvanicum</i>	Striped maple	Block 6x3 in.	Little Traverse	Morrice & Crandall.
130	"	"	Board 3x10 in.	"	Agricultural College.
131	"	"	"	"	"
132	"	"	"	"	"
133	"	"	"	"	"
134	"	"	"	"	"
135	<i>Acer spicatum</i>	Mountain maple	Block 6x3 in.	Grand Lodge	Agricultural College.
136	"	"	Board 2x10 in.	"	"
137	"	"	"	"	"
138	"	"	"	"	"
139	"	"	Seeds.	"	"
140	<i>Acer saccharinum</i>	Sugar or rock maple	Cross section 21 in.	Lansing	"
141	"	"	Block 6x6 in.	"	"
142	"	"	* Board 7x16 in.	East Saginaw	Jesse Hoyt.
143	"	"	"	"	"

* Birdseye.

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
144	<i>Acer saccharinum</i>	Sugar or rock maple.....	* Cross section 20 in. in.	Little Traverse.....	Morrice & Crandall.
145	"	"	Board 4x10 in.	Grand Rapids.....	Phoenix Mfg Co.
146	"	"	* Board 8x16 in.	Osego.....	O. M. Barnes.
147	"	"	"	"	"
148	"	"	"	"	Agricultural College.
148 a	"	"	"	"	"
149	"	"	"	"	"
149 a	"	"	"	"	"
150	"	"	"	"	"
150 a	"	"	Slab 8x16 in.	"	"
151	"	"	* Board 8x16 in.	Petosky.....	"
151 a	"	"	"	"	"
152	"	"	"	"	"
152 a	"	"	"	"	"
153	"	"	"	"	"
153 a	"	"	"	Osego.....	"
154	"	"	"	Saginaw City.....	D. Hardin & Co.
154 a	"	"	"	Grand Rapids.....	Nelson, Matter & Co.
155	"	"	"	"	"
155 a	"	"	"	"	"
156	"	"	"	"	"
157	"	"	"	"	"
158	"	"	"	"	"
159	<i>Acer saccharinum nigrum</i> var.....	Black maple.....	+ Board 4x10 in.	Lansing.....	Phoenix Mfg Co.
160	"	"	Block 4x6 in.	Grand Rapids.....	Agricultural College.
161	"	"	Cross section 11 in.	Lansing.....	"
162	"	"	Board 8x16 in.	"	"
163	"	"	"	"	"
164	"	"	"	"	"
165	<i>Acer dasycarpum</i>	White or silver maple.....	Cross section 20 in.	Lansing.....	Agricultural College.
166	"	"	Block 6x6 in.	"	"
167	"	"	Board 8x16 in.	"	"
168	"	"	"	"	"
169	"	"	"	"	"
170	"	"	"	"	"
171	"	"	"	"	"

172	<i>Acer dasycarpum</i>	White or silver maple.	Cross section 20 in.	Lansing	Agricultural College.
173	<i>Acer rubrum</i>	Red maple	Block 6x5 in.	"	"
174	"	"	Board 6½x16 in.	East Saginaw	Jesse Hoyt.
175	"	"	"	"	"
176	"	"	"	"	"
177	"	"	Board 8x16 in.	Coopersville	W. S. Cole.
178	"	"	"	"	"
179	"	"	"	Lansing	Agricultural College.
180	"	"	"	"	"
181	"	"	"	"	"
182	"	"	"	"	"
183	"	"	"	Saginaw City	D. Hardin & Co.
184	"	"	"	"	"
185	"	"	"	"	"
186	"	"	"	Grand Rapids	Nelson, Matter & Co.
187	<i>Nyquedo aceroides</i>	Ash-Fl'd maple or box elder	Block 6x6 in.	Lansing	Agricultural College.
188	"	"	Cross section 11 in.	"	"
189	"	"	Board 8x16 in.	"	"
190	"	"	"	"	"
191	"	"	"	"	"
192	"	"	Seeds	"	"
193	"	"	"	"	"
194	"	"	"	"	"
195	"	"	"	"	"
196	"	"	"	"	"
197	"	"	"	"	"
198	"	"	"	"	"
199	"	"	"	"	"
200	"	"	"	"	"
201	<i>Amorpha fruticosa</i>	False indigo.	"	"	"
202	<i>Cercis Canadensis</i>	Red-bud or Judas-tree.	Block 6x6 in.	Adrian	H. E. Owen.
203	"	"	Board 4x10 in.	"	Agricultural College.
204	"	"	"	"	"
205	"	"	"	"	"
206	"	"	"	"	"
207	"	"	"	"	"
208	"	"	"	"	"
209	"	"	"	"	"
210	"	"	"	"	"
211	<i>Gymnocladus Canadensis</i>	Kentucky coffee-tree.	Block 6x5 in.	Lansing	Agricultural College.
212	"	"	† Cross section 13 in.	Macon	Israel Pennington.

* Birdseye.

† Veneering.

‡ Once transplanted in nursery.

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
213	<i>Gymnocladus Canadensis</i>	Kentucky coffee-tree.....	* Board 8x16 in.....	Macon.....	Agricultural College.
214	"	"	"	"	"
215	"	"	"	"	"
216	"	"	"	"	"
216a	"	"	"	"	"
217	"	"	Seeds.....	Rollin.....	"
218	"	"	"	"	"
219	"	"	"	"	"
220	"	"	"	"	"
221	"	"	"	"	"
222	<i>Glutischia triacanthos</i>	Honey locust.....	Cross section 6½ in.....	Adrian.....	H. E. Owen.
223	"	"	Block 6x6½ in.....	"	"
224	"	"	Board 4x10 in.....	"	Agricultural College.
225	"	"	"	"	"
226	"	"	"	"	"
227	"	"	"	"	"
228	"	"	"	"	"
229	"	"	"	"	"
230	"	"	"	"	"
231	<i>Prunus Americana</i>	Wild yellow or red plum	Block 5x6 in.....	Orion.....	R. C. Carpenter.
232	"	"	Board 4x10 in.....	"	Agricultural College.
233	"	"	"	"	"
234	"	"	"	"	"
235	"	"	"	"	"
236	<i>Prunus pumila</i>	Dwarf cherry.....	Block 6x¾ in.....	Ludington.....	"
237	<i>Prunus Pennsylvanica</i>	Wild red cherry.....	Block 6x4 in.....	Grand Ledge.....	"
238	"	"	Board 2x10 in.....	"	"
239	"	"	"	"	"
240	"	"	"	"	"
241	"	"	"	"	"
242	<i>Prunus Virginiana</i>	Choke cherry.....	Block 6x3 in.....	Lansing.....	Agricultural College.
243	"	"	Board 2x10 in.....	"	"
244	"	"	"	"	"
245	"	"	"	"	"
246	"	"	"	"	"
247	"	"	"	"	"
248	<i>Prunus serotina</i>	Black Cherry.....	Block 6x6 in.....	Lansing.....	Agricultural College.

249	<i>Prunus serotina</i>	Black Cherry.....	Cross section 24 in. Board 8x16 in.....	Lansing..... " East Saginaw.....	Agricultural College, Jesse Hoyt.
250	" "	" "	" "	" "	" "
251	" "	" "	Board 4x10 in.....	Grand Rapids.....	Phoenix Manuf'g Co.
252	" "	" "	Board 8x16 in.....	Lansing.....	Agricultural College,
253	" "	" "	" "	Saginaw City.....	D. Hardin & Co.
254	" "	" "	" "	Grand Rapids.....	Nelson, Matter & Co.
255	" "	" "	" "	" "	" "
256	" "	" "	" "	Lansing.....	Agricultural College,
257	" "	" "	" "	" "	A. A. Wilbur.
258	" "	" "	" "	Grand Rapids.....	Nelson, Matter & Co.
259	" "	" "	" "	" "	" "
260	" "	" "	" "	" "	" "
261	" "	" "	" "	" "	" "
262	" "	" "	" "	" "	" "
263	" "	" "	Block 6x1 in.....	Lansing.....	Agricultural College,
264	<i>Spiraea opulifolia</i>	Nine bark.....	† Block 6x $\frac{1}{2}$ in.....	" "	" "
265	<i>Spiraea salicifolia</i>	Common meadow-sweet.....	" "	" "	" "
266	<i>Spiraea tomentosa</i>	Hard bark or steeple-bush.....	" "	" "	" "
267	<i>Spiraea labata</i>	Queen of prairie.....	Block 6x $\frac{1}{2}$ in.....	Lansing.....	Agricultural College.
268	<i>Rosa Carolina</i>	Swamp rose.....	" "	" "	" "
269	<i>Rosa lucida</i>	Dwarf wild rose.....	" "	" "	" "
270	<i>Rosa blanda</i>	Early wild rose.....	Block 6x3 $\frac{1}{2}$ in.....	Lansing.....	Agricultural College.
271	<i>Crataegus coccinea</i>	Scarlet fruited thorn.....	Board 2 $\frac{1}{2}$ x10 in.....	" "	" "
272	" "	" "	" "	" "	" "
273	" "	" "	" "	" "	" "
274	" "	" "	" "	" "	" "
275	" "	" "	" "	" "	" "
276	" "	" "	" "	" "	" "
277	" "	" "	" "	" "	" "
278	<i>Crataegus tomentosa</i>	Black or pear thorn, var.....	Block 6x4 in.....	Lansing.....	Agricultural College.
279	" "	" "	Block 6x6 in.....	" "	" "
280	" "	" "	Board 3 $\frac{1}{2}$ x10 in.....	" "	" "
281	" "	" "	" "	" "	" "
282	" "	" "	" "	" "	" "
283	<i>Crataegus Crus-galli</i>	Cockspur thorn.....	Board 2x10 in.....	" "	" "
284	" "	" "	" "	" "	" "
285	" "	" "	" "	" "	" "
286	" "	" "	" "	" "	" "
287	" "	" "	Block 6x4 in.....	" "	" "
288	" "	" "	" "	" "	" "

* Once transplanted in nursery.

† Two specimens.

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
289	<i>Crataegus</i>	Hawthorn.....	Board 4x10 in.....	Pav Paw.....	G. E. Breck,
290	<i>Pyrus coronaria</i>	American crab-apple.....	Block 6x3 in.....	Lansing.....	Agricultural College.
291	".....	".....	Board 2x10 in.....	".....	".....
292	".....	".....	".....	".....	".....
293	".....	".....	".....	".....	".....
294	".....	".....	".....	".....	".....
295	".....	".....	".....	".....	".....
296	<i>Pyrus arbutifolia</i>	Choke berry.....	Block 6x $\frac{3}{4}$ in.....	Lansing.....	Agricultural College.
297	".....	".....	".....	".....	".....
298	<i>Pyrus Americana</i>	Mountain ash.....	Block 6x5 in.....	Ludington.....	Agricultural College.
299	".....	".....	Board 4x10 in.....	".....	".....
300	".....	".....	".....	".....	".....
301	".....	".....	".....	".....	".....
302	".....	".....	".....	".....	".....
303	".....	".....	".....	".....	".....
304	<i>Pyrus sambucifolia</i>	".....	".....	".....	".....
305	".....	".....	".....	".....	".....
306	".....	".....	".....	".....	".....
307	<i>Amelanchier Canadensis</i>	Shad-bush, June berry, ser-vice berry.....	Block 6x4 in.....	Lansing.....	Agricultural College.
308	".....	Shad-bush, June berry, ser-vice berry.....	Board 2x10 in.....	".....	".....
309	".....	Shad-bush, June berry, ser-vice berry.....	".....	".....	".....
310	".....	Shad-bush, June berry, ser-vice berry.....	".....	".....	".....
311	".....	Shad-bush, June berry, ser-vice berry.....	".....	".....	".....
312	".....	Shad-bush, June berry, ser-vice berry.....	".....	".....	".....
313	<i>Ribes cynosbati</i>	".....	Block 6x $\frac{1}{2}$ in.....	Lansing.....	Agricultural College.
314	<i>Ribes hirtellum</i>	".....	Block 6x $\frac{1}{4}$ in.....	".....	Agricultural College.
315	<i>Ribes rotundifolium</i>	".....	".....	".....	".....
316	<i>Ribes lacustre</i>	".....	Block 6x $\frac{1}{4}$ in.....	Lake county.....	Agricultural College.
317	<i>Ribes prostratum</i>	Wild black currant.....	Block 6x $\frac{1}{2}$ in.....	Lansing.....	".....
318	<i>Ribes floridum</i>	".....	".....	".....	".....
319	".....	".....	".....	".....	".....

	<i>Ribes rubrum</i>	Red currant.....	Block 6x2½ in.....	Lansing.....	No. W. Post.
320	"	"			
321	<i>Hamamelis Virginica</i>	Witch hazel.....	Block 6x5 in.....	Grand Lodge.....	Agricultural College.
322	"	"	Board 3½x10 in.....	"	"
323	"	"	"	"	"
324	"	"	Seeds.....	Lansing.....	"
325	"	"			
326	"	"			
327	"	"			
328	<i>Cornus florula</i>	Flower'g cornel or dogw'd.....	Cross section 7½ in.....	Lansing.....	Agricultural College.
329	"	"	Block 6x5 in.....	"	"
330	"	"	Board 4x10 in.....	"	"
330 a	"	"	"	"	"
331	"	"	"	"	"
331 a	"	"	"	"	"
332	"	"	"	"	"
333	"	"	"	"	"
334	<i>Cornus circinnata</i>	Round-leaved dogwood.....	Block ¾x6 in.....	Sanford.....	"
335	"	"			
336	"	"			
337	"	"			
338	"	"			
339	<i>Cornus sericea</i>	Silky cornel or kininkinink.....	Block 6x¾ in.....	Lansing.....	Agricultural College.
340	"	"			
341	"	"			
342	"	"			
343	"	"			
344	<i>Cornus stolonifera</i>	Red osier dogwood.....	Block 6x1 in.....	Lansing.....	Agricultural College.
345	"	"			
346	<i>Cornus paniculata</i>	Panicled cornel.....	* Block 1½x6 in.....	Lansing.....	Agricultural College.
346 a	"	"	Board 1½x6 in.....	"	"
347	<i>Cornus alternifolia</i>	Alternate leaved cornel.....	Block 6x1½ in.....	Grand Lodge.....	"
348	"	"	Block 6x1¾ in.....	"	"
349	"	"	Board 3x10 in.....	"	"
350	"	"	"	"	"
350 a	"	"	"	"	"
351	<i>Nyssa multiflora</i>	Pepperidge sour-gum.....	Cross section 20 in.....	Lansing.....	"
352	"	"	Block 6x6 in.....	"	"
353	"	"	Board 8x16 in.....	"	"
354	"	"	"	"	"
355	"	"	"	"	"

* Two specimens.

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
356	<i>Nyssa multiflora</i>	Pepperidge sout-gum.			
357	"	"			
358	"	"			
359	"	"			
360	"	"			
361	<i>Symphoricarpus occidentalis</i>	Wolf berry.....	Block 6x1½ in.....	Lansing.....	Agricultural College.
362	"	"			
363	"	"			
364	"	"			
365	<i>Symphoricarpus racemosus</i>	Snow berry.			
366	<i>Symphoricarpus vulgaris</i>	Coral berry or Indian currant.			
367	<i>Lonicera grata</i>	American woodbine.	6 in. x 1½ in.....	Lansing.....	Agricultural College.
368	<i>Lonicera flava</i>	Yellow honeysuckle.			
369	<i>Lonicera parviflora</i>	Small honeysuckle.	6 in. x ¼ in.....	Lansing.....	Agricultural College.
370	<i>Lonicera hispidula</i>	Hairy honeysuckle.	6 in. x ¼ in.....	"	"
371	<i>Lonicera citrata</i>	Fly honeysuckle.			
372	<i>Lonicera cerulea</i>	Mountain Fly honeysuckle.	6 in. x 3/4 in.....	Lansing.....	Agricultural College.
373	<i>Lonicera oblongifolia</i>	Swamp Fly honeysuckle.	6 in. x ¼ in.....	"	"
374	<i>Diervilla trifida</i>	Bush honeysuckle.	6 in. x 3/8 in.....	"	"
375	<i>Sambucus Canadensis</i>	Common elder.	6 in. x 5 in.....	Grand Traverse.....	W. N. Adsit.
376	<i>Sambucus pubens</i>	Red berried elder.			
377	"	"			
378	"	"			
379	"	"			
380	"	"			
381	<i>Viburnum lentago</i>	Sheep berry, sweet viburnum.....	Block 3½x6 in.....	Lansing.....	Agricultural College.
382	"	Sheep berry, sweet viburnum.....	Board 2x10 in.....	"	"
382 a	"	Sheep berry, sweet viburnum.....	"	"	"
383	"	Sheep berry, sweet viburnum.....	"	"	"
383 a	"	Sheep berry, sweet viburnum.....	"	"	"
384	<i>Viburnum nudum</i>	White rod.....	6 in x 7/8 in.....	"	"

385	<i>Viburnum dentatum</i>	Arrow wood.....	6 in. x $\frac{3}{4}$ in.....	Lausung	Agricultural College.
386	<i>Viburnum pubescens</i>	Downy Arrow wood.....	6 in. x $\frac{1}{2}$ in.....	"	"
387	<i>Viburnum acerifolium</i>	Dockmackie, maple-leaved arrow wood.....	6 in. x $\frac{1}{2}$ in.....	Lausung	"
388	<i>Viburnum pauciflorum</i>	Cranberry tree.....	6 in. x 2 in.....	Lausung	"
389	<i>Viburnum opulus</i>	" " " ".....			
390	" " " ".....	" " " ".....			
391	" " " ".....	" " " ".....			
392	" " " ".....	" " " ".....			
393	<i>Viburnum lantanoides</i>	Hobble-bush, wayfaring tree.....			
394	" " " ".....	Hobble-bush, wayfaring tree.....			
395	" " " ".....	Hobble-bush, wayfaring tree.....			
396	<i>Cephalanthus occidentalis</i>	Button-bush.....	6 in. x 2 in.....	Lausung	Agricultural College.
397	" " " ".....	" " " ".....	Board 2x10 in.....	"	"
398	" " " ".....	" " " ".....	"		
399	" " " ".....	" " " ".....			
340 a	<i>Gaylussacia racemosa</i>	Black huckleberry.....	6 in. x $\frac{1}{2}$ in.....	Lausung	Agricultural College.
341 a	<i>Vaccinium pennsylvanicum</i>	Dwarf blueberry.....	6 in. x 1 in.....	"	"
342 a	<i>Vaccinium corymbosum</i>	Swamp blueberry.....			
343 a	" " " ".....	" " " ".....			
344 a	" " " ".....	" " " ".....			
345 a	<i>Arctostaphylos uva-ursi</i>	Bearberry.....	$\frac{1}{2}$ x 6 in.....	Sanford	Agricultural College.
346 a	<i>Epigaea repens</i>	Trailing arbutus.....			
347 a	<i>Cassandra ciliolata</i>	Leatherleaf.....	6 in. x $\frac{3}{8}$ in.....	Lake Co.	Agricultural College.
248 a	<i>Kalmia angustifolia</i>	Lambkill, sheep laurel.....			
349 a	<i>Kalmia glauca</i>	Pole laurel.....	6 in. x $\frac{1}{4}$ in.....	Cham Lake.	Agricultural College.
350 a	<i>Ledum latifolium</i>	Labrador tea.....			
351 a	<i>Ilex verticillata</i>	BPK alder, winterberry.....	6 in. x $2\frac{1}{2}$ in.....	Lausung	Agricultural College.
352 a	" " " ".....	" " " ".....			
353 a	" " " ".....	" " " ".....			
354 a	<i>Nemopanthes canadensis</i>	Mountain holly.....	6 in. x $\frac{1}{2}$ in.....	Lausung	Agricultural College.
355 a	" " " ".....	" " " ".....	2x10-in. Board.....	"	"
356 a	" " " ".....	" " " ".....	"		
357 a	" " " ".....	" " " ".....			
358 a	<i>Fraxinus Americana</i>	White ash.....	Section 20 in.....	Lausung	Agricultural College.
359 a	" " " ".....	" " " ".....	6 in. x 5 in.....	"	"

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
360 a	<i>Fraxinus Americana</i>	White ash.....	2 ft. 4 in. x 2½ in.....	Jackson.....	Austin, Tomlinson & Webster.
361 a	"	"	8 in. x 16 in.....	Lausling.....	Agricultural College.
362 a	"	"	"	"	"
363 a	"	"	"	"	"
364 a	"	"	10 in. x 20 in.....	"	"
365 a	"	"	4x10 in.....	"	"
366 a	"	"	"	"	"
367 a	"	"	10 in. x 4 in.....	Grand Rapids.....	Phoenix Co.
368 a	"	"	Board 8x16 in.....	Saginaw City.....	D. Hardin & Co.
369 a	"	"	"	"	"
370 a	"	"	Seeds.....	Grand Lodge.....	Agricultural College.
371 a	"	"	Board 8x16 in.....	Grand Rapids.....	Nelson, Matter & Co.
371 b	"	"	"	"	"
372 a	"	"	"	"	"
372 b	"	"	"	"	"
373 a	"	"	"	"	"
373 b	"	"	"	"	"
374 a	"	"	"	Lausling.....	A. A. Wilbur.
375 a	"	"	"	"	"
375 b	"	"	"	"	"
376 a	"	"	"	"	"
376 b	"	"	"	"	"
377 a	"	"	"	"	"
377 b	"	"	"	"	"
378 a	"	"	Board 8x16 in.....	Grand Rapids.....	Nelson, Matter & Co.
379 a	<i>Fraxinus pubescens</i>	Red ash.....	6 in. by 6 in.....	Lausling.....	Agricultural College.
380 a	"	"	Board 4x10 in.....	"	"
380 b	"	"	"	"	"
381 a	"	"	"	"	"
381 b	"	"	"	"	"
382 a	"	"	"	"	"
382 b	"	"	"	"	"
383 a	"	"	"	"	"
384 a	<i>Fraxinus viridis</i>	Green ash.....	6 in. x 6 in.....	Grand Lodge.....	"
385 a	"	"	Section 7 in.....	"	"
386 a	"	"	Board 4x10 in.....	"	"
387 a	"	"	"	"	"
388 a	"	"	"	"	"

389 a	<i>Fraxinus sambucifolia</i>	Black ash	Section 19 in.	Lansing	Agricultural College.
390 a	"	"	6 in. x 6 in.	"	"
391 a	"	"	Board 8x16 in.	"	"
391 b	"	"	"	"	"
392 a	"	"	"	"	"
392 b	"	"	"	"	"
393 a	"	"	"	"	"
394 a	"	"	"	Saginaw City	D. Hardin & Co.
395 a	"	"	6 in. by 5 in.	Lansing	Agricultural College.
396 a	"	"	* Board 4x10 in.	Grand Rapids	Phoenix Co.
397 a	"	"	Board 8x16 in.	Lansing	A. A. Wilbur.
398 a	"	"	"	"	"
399 a	"	"	"	"	"
400	"	"	"	"	"
401	"	"	"	"	"
402	"	"	"	"	"
403	"	"	"	"	"
404	"	"	"	"	"
405	"	"	"	"	"
406	"	"	"	"	"
407	"	"	"	"	"
408	"	"	"	"	"
409	"	"	"	"	"
410	"	"	"	"	"
411	"	"	"	"	"
412	"	"	"	"	"
413	"	"	"	"	"
414	"	"	"	"	"
415	<i>Fraxinus quadrangulata</i>	Blue ash	Section 17 in.	Lansing	Agricultural College.
416 a	"	"	Board 8x16 in.	"	"
416	"	"	6 in. by 5 in.	"	"
417 a	"	"	16 in x 6 in.	Coldwater	J. H. Lawrence.
417 b	"	"	8x16 in. board	Lansing	"
417	<i>Sassafras officinale</i>	Sassafras	Section 11 in.	"	Agricultural College.
418	"	"	6 in x 5 1/2 in.	"	"
419	"	"	Board 8x16 in.	"	"
420	"	"	"	"	"
421	"	"	"	"	"
422	<i>Fraxinus quadrangulata</i>	Blue ash	"	"	"
423	"	"	"	"	"

* Veneered with knot.

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
424	<i>Fraxinus quadrangulata</i>	Blue ash.....	Board 8x16 in.....	Lansing.....	Agricultural College.
425	".....	".....	".....	".....	".....
426	".....	".....	".....	".....	".....
427	".....	".....	".....	".....	".....
428	<i>Lindera benzoin</i>	Spice-bush, fever-bush.....	6 in. by 2 in.....	Kalamazoo.....	D. T. Fox.
428 a	".....	".....	10 in. x 1 ⁵ / ₈ in.....	".....	".....
428 b	".....	".....	10 in. x 1 ¹ / ₂ in.....	".....	".....
429	<i>Dirca palustris</i>	Leatherwood, moose wood.....	6 in. x 2 ¹ / ₂ in.....	Ludington.....	Agricultural College.
430	<i>Shepherdia Canadensis</i>	Canadian shepherdia.....	6 in. x 1 ¹ / ₂ in.....	".....	".....
431	<i>Ulmus Americana</i>	American elm.....	Section 14 in.....	Lansing.....	".....
432	".....	".....	6 in. x 6 in.....	".....	".....
433	".....	".....	10 in. x 4 in.....	Grand Rapids.....	Phoenix Co.
434	".....	".....	Board 8x16 in.....	Lansing.....	Agricultural College.
435	".....	".....	".....	".....	".....
436	".....	".....	".....	".....	".....
437	".....	".....	".....	".....	".....
438	".....	".....	".....	".....	".....
439	".....	".....	".....	".....	".....
440	<i>Ulmus fulva</i>	Red or slippery elm.....	6 in. by 5 in.....	Lansing.....	Agricultural College.
441	".....	".....	Section 12 in.....	".....	".....
442	".....	".....	Board 7x16 in.....	".....	".....
443	".....	".....	Board 4x10 in.....	".....	".....
444	".....	".....	".....	".....	".....
445	".....	".....	".....	".....	".....
446	".....	".....	".....	".....	".....
447	".....	".....	".....	".....	".....
448	".....	".....	".....	".....	".....
449	".....	".....	".....	".....	".....
450	".....	".....	".....	".....	".....
451	<i>Ulmus racemosa</i>	White or rock elm.....	Section 20 in.....	Lansing.....	Agricultural College.
452	".....	".....	6 in. x 6 in.....	".....	".....
453	".....	".....	Board 8x16 in.....	".....	".....
454	".....	".....	".....	".....	".....
455	".....	".....	".....	".....	".....
456	".....	".....	".....	".....	".....
457	".....	".....	".....	".....	".....
458	".....	".....	".....	Saginaw City.....	D. Hardin & Co.

459	<i>Ulmus racemosa</i>	White or rock elm.	6 in. x 5 in.	Lansing	Agricultural College.
460	"	"	Board 8x16 in.	Saginaw City.	D. Hardin & Co.
461	<i>Celtis occidentalis</i>	Hackberry, sugarberry, or tree nettle.	"	Sanford	Agricultural College.
462	"	Hackberry, sugarberry, or tree nettle.	"	"	"
463	"	Hackberry, sugarberry, or tree nettle.	"	"	"
464	"	Hackberry, sugarberry, or tree nettle.	"	"	"
465	"	Hackberry, sugarberry, or tree nettle.	"	"	"
466	"	Hackberry, sugarberry, or tree nettle.	"	"	"
467	"	Hackberry, sugarberry, or tree nettle.	"	"	"
468	"	Hackberry, sugarberry, or tree nettle.	"	Lansing	"
469	<i>Morus rubra</i>	Red mulberry.	6 in. x 5 in.	Lansing	Agricultural College.
470	"	"	Section 16 in.	Dearborn	A. G. Guley.
470 a	"	"	Board 4x10 in.	Richland	Rev. E. H. Day.
471	"	"	Board 8x16 in.	Dearborn.	Agricultural College.
472	"	"	"	"	"
472 a	"	"	"	"	"
473	"	"	"	"	"
473 a	"	"	4x10 in.	Richland	"
474	"	"	8x16 in.	Dearborn.	"
474 a	"	"	"	"	"
475	<i>Platanus occidentalis</i>	Platanetree, sycamore, but-tonwood.	6 in. x 5 in.	Lansing	Agricultural College.
476	"	Platanetree, sycamore, but-tonwood.	Section 18 in.	"	"
477	"	Platanetree, sycamore, but-tonwood.	Seeds	"	"
478	"	Platanetree, sycamore, but-tonwood.	Board 8x16 in.	"	"
479	"	Platanetree, sycamore, but-tonwood.	"	"	"
480	"	Platanetree, sycamore, but-tonwood.	"	"	"

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
481	<i>Platanus occidentalis</i>	Planetree, sycamore, but- tonwood.			
482	"	Planetree, sycamore, but- tonwood.			
483	"	Planetree, sycamore, but- tonwood.			
484	"	Planetree, sycamore, but- tonwood.			
485	"	Planetree, sycamore, but- tonwood.			
486	<i>Juglans cinerea</i>	Butternut.	14 in. x 7½ in.	Battle Creek.	J. A. Robinson.
487	"	"	17 in. x 8 in.	"	"
488	"	"	Section 16 in.	Lansing.	Agricultural College.
489	"	"	10 in. x 4 in.	Grand Rapids.	Phoenix Co.
490	"	"	"	"	"
491	"	"	6 in. x 6 in.	Lansing.	Agricultural College.
492	"	"	Board 8x16 in.	Saginaw.	D. Hardin & Co.
493	"	"	"	"	"
493 a	"	"	"	Grand Rapids.	Nelson, Matter & Co.
494	"	"	Seeds	Lansing.	Agricultural College.
495	"	"	Board 8x16 in.	Grand Rapids.	Nelson, Matter & Co.
496	"	"	"	"	"
497	"	"	"	"	"
498	"	"	"	"	"
499	<i>Juglans nigra</i>	Black walnut	Section 22 in.	Lansing.	Agricultural College.
500	"	"	10 in. x 4 in.	Grand Rapids.	Phoenix Co.
501	"	"	"	"	"
502	"	"	"	"	"
503	"	"	"	"	"
504	"	"	"	"	"
505	"	"	"	"	"
506	"	"	18 in. by 9 in. and 4 in.	Redmond.	W. R. Kiddler.
507	"	"	Board 8x16 in.	Lansing.	Agricultural College.
508	"	"	4 in. x 6 in.	"	"
509	"	"	Board 8x16 in.	Saginaw City.	D. Hardin & Co.
510	"	"	"	"	"
511	"	"	Seeds	Lansing.	Agricultural College.

512	<i>Juglans nigra</i>	Black walnut.....	Board 8x16 in.....	Grand Rapids.....	Nelson, Matter & Co.
513	"	"	"	"	"
514	"	"	"	Lausling.....	D. G. Canfield & Co.
515	"	"	4x10 in.....	Grand Rapids.....	Phoenix Co.
515 a	"	"	8x16 in.....	Lausling.....	A. A. Wilbur.
516	"	"	"	"	"
516 a	"	"	"	"	"
517	"	"	"	"	"
517 a	"	"	"	"	"
518	"	"	"	Grand Rapids.....	Nelson, Matter & Co.
518 a	"	"	"	"	"
519	"	"	"	"	"
519 a	"	"	"	"	"
520	"	"	"	"	"
520 a	"	"	"	"	"
521	<i>Carya alba</i>	Shell-bark or shag-bark hickory.....	4x10 in.....	"	Phoenix Co.
522	"	Shell-bark or shag-bark hickory.....	6 in. x 5 in.....	Lausling.....	Agricultural College.
523	"	Shell-bark or shag-bark hickory.....	Section 15 in.....	"	Warren Burcham.
524	"	† Shell-bark or shag-bark hickory.....	2 ft. x 4 in. x 2½ in.	Jackson.....	Austin, Tomlinson & Webster.
525	"	Shell-bark or shag-bark hickory.....	4½ ft. x 15 in. x 2 in.	Monroe.....	J. Vanwormer.
526	"	Shell-bark or shag-bark hickory.....	12 ft. x 18 in. x 1½ in.	Franklin.....	Dr. Daniel Broughton.
526 b	"	Shell-bark or shag-bark hickory.....	Board 8x16 in.....	Lausling.....	Agricultural College.
527	"	Shell-bark or shag-bark hickory.....	Seeds.....	"	"
528	"	Shell-bark or shag-bark hickory.....	Board 8x16 in.....	"	"
529	<i>Carya macrocarpa</i>	Shell-bark or shag-bark hickory.....	"	Saginaw City.....	D. Hardin & Co.
530	"	Small fruited hickory	6 in. by 5 in.....	Lausling.....	"
531	"	"	Board 8x16 in.....	"	"
532	"	"	4x10 in.....	"	"
533	"	"	"	"	"
533 a	"	"	"	"	"
534	<i>Carya sulcata</i>	Western shellbark hickory	Seeds.....	"	"
			Section 15 in.....	Monroe.....	C. E. Sumner.

* Taken from stump 9½ feet in diameter.

† Vencered.

‡ Second growth.

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
535	<i>Carya sulcata</i>	Western shellbark hickory	Board 8x16 in.	Monroe	Agricultural College.
536	"	"	Seeds	"	"
537	"	"			C. E. Sumner.
538	"	"			
539	"	"			
540	<i>Carya porcina</i>	Pignut, brown hickory.			
541	"	"			
542	"	"			
543	"	"			
544	"	"			
545	"	"			
546	<i>Carya amara</i>	Bitternut	Section 14 in.	Laansing	Agricultural College.
547	"	"	6 in. x 6 in.	"	"
548	"	"	Board 4x10 in.	"	"
549	"	"	"	"	"
550	"	"	"	"	"
551	"	"	"	"	"
552	<i>Quercus alba</i>	White oak	Section 22 in.	"	"
553	"	"	6 in. x 7 in.	"	"
554	"	"	2 ft. x 4 in. x 2½ in.	Jackson	Austin, Tomlinson and Webster.
555	"	"	10x1 in.	Grand Rapids	Phoenix Co.
556	"	"	"	"	"
557	"	"	4 ft. x 16 in. x 2½	Monroe	J. Van Wormer.
558	"	"	Board 8x16 in.	Saginaw City	D. Hardin & Co.
559	"	"	Seeds	Laansing	Agricultural College.
560	"	"	Board 8x16 in.	Grand Rapids	Nelson, Matter & Co.
561	"	"	"	"	"
562	"	"	"	"	"
563	"	"	"	"	"
564	"	"	"	"	"
565	"	"	"	"	"
566	"	"	"	"	"
567	"	"	"	"	"
568	"	"	"	"	"
569	"	"	"	"	"
570	"	"	"	"	"

571	<i>Quercus olustibba</i>	Post oak or box white oak	Block 6x2 in.	Sanford	Agricultural College.
572	"	"	"	"	"
573	"	"	"	"	"
574	"	"	"	"	"
575	"	"	"	"	"
576	"	"	"	"	"
577	"	"	"	"	"
578	"	"	"	"	"
579	<i>Quercus macrocarpa</i>	Bur oak, mossy cup white oak.	Section 16 in.	Lansing	Agricultural College.
580	"	Bur oak, mossy cup white oak.	6x6 in.	"	"
581	"	Bur oak, mossy cup white oak.	Board 8x16 in.	"	"
582	"	Bur oak, mossy cup white oak.	"	"	"
583	"	Bur oak, mossy cup white oak.	"	"	"
584	"	Bur oak, mossy cup white oak.	"	"	"
585	"	Bur oak, mossy cup white oak.	"	"	"
585 b	"	Bur oak, mossy cup white oak.	"	"	"
586	<i>Quercus bicolor</i>	Swamp white oak.	Seeds.	Lansing	Agricultural College.
587	"	"	Section 17 inch.	"	"
588	"	"	6x5 inch.	"	"
589	"	"	12x20 inch.	Lyons.	J. F. Fosmire.
590	"	"	Board 8x16	Lansing	Agricultural College.
591	"	"	Seeds	"	"
592	"	"	"	"	"
593	<i>Quercus prinus</i>	Chestnut oak.	Section 16 inch.	Lansing	Agricultural College.
594	"	"	Board 8x16 in.	"	"
595	"	"	"	"	"
596	"	"	"	"	"
597	"	"	"	"	"
598	"	"	"	"	"
599	"	"	"	"	"
600	"	"	"	"	"
571 a	<i>Quercus prinus</i> var. <i>acuminata</i>	Yellow chestnut oak.	"	"	"

*Second growth.

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
572 a	<i>Quercus Prinus</i> var. <i>acuminata</i> .	Yellow chestnut oak.			
573 a	" "	" "			
574 a	" "	" "			
575 a	" "	" "			
576 a	" "	" "			
577 a	" "	" "			
578 a	" "	" "			
579 a	" "	" "			
581 a	<i>Quercus imbricata</i>	Laurel or shingle oak.			
582 a	" "	" "			
583 a	" "	" "			
584 a	" "	" "			
585 a	" "	" "			
586 a	" "	" "			
587 a	<i>Quercus coccinea</i>	Scarlet oak.	Section 12 inch.	Lausling	Agricultural College.
588 a	" "	" "	Board 8x16 in.	"	"
589 a	" "	" "	" "	"	"
590 a	" "	" "	" "	"	"
591 a	" "	" "	Seeds.	"	"
592 a	" "	" "			
593 a	" "	" "			
594 a	" "	" "			
595 a	" "	" "			
596 a	" "	" "			
597 a	" "	" "			
598 a	" "	" "			
599 a	" "	" "			
600 a	* <i>Quercus coccinea</i> var. <i>undulata</i>	Black oak or Quercitron	Block 6x6 in.	Lausling	Agricultural College.
601	" "	" "	Board 8x16 in.	Birmingham	"
602	" "	" "	" "	"	"
603	" "	" "	" "	"	"
604	" "	" "	" "	Saginaw City	D. Hardin & Co.
605	" "	" "	" "	Lausling	Agricultural College.
606	" "	" "	Seeds.		
607	" "	" "			
608	" "	" "			

516 a	<i>Quercus rubra</i>	Red oak.....	Section.....	Lansing.....	Agricultural College.
517 a	"	"	Board 8x16 in.	"	"
518 a	"	"	"	"	"
519 a	"	"	"	"	"
520 a	"	"	"	"	"
521 a	"	"	"	"	"
522 a	"	"	"	"	"
523 a	"	"	"	"	"
524 a	"	"	"	"	"
525 a	"	"	"	"	"
526 a	"	"	"	"	"
527 a	"	"	"	"	"
528 a	"	"	"	"	"
529 a	"	"	"	"	"
531 a	<i>Quercus palustris</i>	Swamp, Spanish, or pin oak	Seeds.....	Saginaw City.	D. Hardin & Co.
532 a	"	"	"	Agricultural College.	Lansing.
533 a	"	"	"	"	"
534 a	"	"	"	"	"
535 a	"	"	"	"	"
536 a	"	"	"	"	"
537 a	"	"	"	"	"
538 a	"	"	"	"	"
539 a	<i>Castanea vesca</i>	Chestnut.....	Section.....	Wayne Co.	S. W. Walker
540 a	"	"	Board 8x16 in.	Wayne	Agricultural College.
541 a	"	"	"	"	"
542 a	"	"	"	"	"
543 a	"	"	"	"	"
544 a	"	"	"	"	"
545 a	"	"	"	"	"
546 a	"	"	"	"	"
547 a	"	"	"	"	"
548 a	"	"	"	"	"
549 a	"	"	"	"	"
550 a	<i>Pumila</i>	Chingapin.....	Seeds.....	Saginaw City.	D. Hardin & Co.
551 a	"	"	Burrs	Lansing	Agricultural College.
552 a	<i>Fagus ferruginea</i>	American beech.....	Section 2 feet.	Adrian	B. W. Steere.
553 a	"	"	4x10 inch.	"	"
554 a	"	"	"	"	"
555 a	"	"	6x6 inch.	"	"
556 a	"	"	10x4 inch.	Grand Rapids.	Phoenix Manuf'g Co.

* Missing.

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
557 a	<i>Fagus ferruginea</i>	American beech.....	10x4 inch.....	Grand Rapids.....	Phoenix Manuf'g Co.
558 a	".....	".....	Board 8x16 in.....	Saginaw City.....	D. Hardin & Co.
559 a	".....	".....	Seeds.....	Lausling.....	Agricultural College.
560 a	".....	".....	".....	".....	".....
561 a	<i>Corylus Americana</i>	Hazle-nut.....	6x3 $\frac{3}{4}$ inch.....	Lausling.....	Agricultural College.
562 a	".....	".....	Seeds.....	Jackson.....	".....
563 a	<i>Corylus rostrata</i>	Beaked hazle-nut.....	6 in. x $\frac{3}{4}$ in.....	Reed City.....	Agricultural College.
564 a	".....	".....	".....	".....	".....
565 a	<i>Astrya Virginica</i>	Iron or lever wood, or hop- horn-beam.....	Section 15 in.....	Battle Creek.....	J. A. Robinson.
566 a	".....	Iron or lever wood, or hop- horn-beam.....	6x6 inch.....	Lausling.....	Agricultural College.
567 a	".....	Iron or lever wood, or hop- horn-beam.....	".....	".....	".....
568 a	".....	Iron or lever wood, or hop- horn-beam.....	8x16 inch.....	Battle Creek.....	J. A. Robinson.
569 a	".....	Iron or lever wood, or hop- horn-beam.....	".....	".....	".....
570 a	".....	Iron or lever wood, or hop- horn-beam.....	".....	".....	".....
571 b	<i>Carpinus Americana</i>	Blue beech, horn-beam.....	Section 7 $\frac{1}{2}$ in.....	Lausling.....	Agricultural College.
572 b	".....	".....	6x7 inch.....	Paw Paw.....	G. E. Brede.
573 b	".....	".....	Board 4x10 in.....	".....	Agricultural College.
574 b	".....	".....	".....	".....	".....
575 b	".....	".....	Seeds.....	Lausling.....	".....
576 b	".....	".....	".....	".....	".....
577 b	<i>Myrica Gale</i>	Sweet gale.....	1 $\frac{1}{2}$ x6 inch block.....	Sanford.....	Agricultural College.
578 b	<i>Comptonia asperifolia</i>	Sweet fern.....	Block 6x6 in.....	".....	".....
579 b	<i>Betula lenta</i>	Cherry, sweet or blk birch.....	Cross section 12 in.....	".....	".....
580 b	".....	".....	Board 4x10 in.....	".....	".....
581 b	".....	".....	Board 8x16 in.....	".....	".....
582 b	".....	".....	".....	".....	".....
583 b	".....	".....	".....	".....	".....
584 b	".....	".....	".....	".....	".....
585 b	".....	".....	".....	".....	".....
586 b	".....	".....	".....	".....	".....
587 b	".....	".....	".....	".....	".....

588 b	<i>Betula lenta</i>	Cherry, or black birch.	Cross section 22 in.	Ludington	Agricultural College.
589 b	<i>Betula lutea</i>	Yellow, or gray birch	Board 8x16 in.	"	"
590 b	"	"	"	"	"
591 b	"	"	"	"	"
592 b	"	"	"	"	"
593 b	"	"	"	"	"
594 b	"	"	"	"	"
595 b	"	"	"	"	"
596 b	"	"	"	"	"
597 b	<i>Betula alba</i> var. <i>papyrifolia</i>	White birch.	Cross section 18 in.	Ludington	Agricultural College.
598 b	"	"	Board 8x16 in.	"	"
599 b	"	"	"	"	"
600 a	"	"	"	"	"
601 a	<i>Betula papyracea</i>	Paper or canoe birch	Cross section 17½ in.	"	"
602 a	"	"	Slab 8x16 in.	"	"
603 a	"	"	Board 8x16 in.	"	"
604 a	"	"	"	"	"
605 a	"	"	"	"	"
606 a	"	"	"	"	"
607 a	"	"	Board 4x10 in.	"	"
608 a	"	"	6 in. x 7 in.	"	"
609	<i>Betula nigra</i>	River or red birch.	Block 6x1½ in.	Lausling	"
610	"	"	Board 1½x10 in.	"	"
611	"	"	"	"	"
612	"	"	"	"	"
613	"	"	"	"	"
614	"	"	"	"	"
615	"	"	"	"	"
616	<i>Betula pumila</i>	Low birch.	Block 6x1 in.	Lausling	Agricultural College.
617	<i>Betula glandulosa</i>	Dwarf Birch.	"	"	"
618	<i>Alnus viridis</i>	Green or Mt. Alder.	"	"	"
619	"	"	"	"	"
620	"	"	"	"	"
621	<i>Alnus incana</i>	Speckled or hoary alder.	"	"	"
622	"	"	"	"	"
623	"	"	"	"	"
624	"	"	"	"	"
625	"	"	"	"	"
626	<i>Alnus serrulata</i>	Smooth alder.	Block 6x9¾ in.	Lausling	Agricultural College.
627	"	"	Board 3½x10 in.	"	"
628	"	"	"	"	"

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
629	<i>Alnus serrulata</i>	Smooth alder.	Block 6x2½ in.....	Lansing.....	Agricultural College.
630	" ".....	" "	Two boards 1x10.....	" ".....	" "
631	" ".....	" "	Board 2x10 in.....	" ".....	" "
632	<i>Salix lucida</i>				
633	" ".....				
634	" ".....				
635	" ".....				
636	" ".....				
637	" ".....				
638	<i>Salix discolor</i>		Block 6x2½ in.....	Grand Traverse.....	Agricultural College.
639	" ".....		Board 2x10 in.....	" ".....	" "
640	" ".....		" "	" ".....	" "
640 a	" ".....		" "	" ".....	" "
641	<i>Salix nigra falcata</i>		Cross section 32½ in.....	Birmingham.....	S. Alexander.
641 a	" ".....		Board 4x10 in.....	" ".....	Agricultural College.
642	" ".....		Board 8x16 in.....	Oakland Co.....	" "
642 a	" ".....		Block 6x4 in.....	" ".....	" "
643	" ".....		Block 8x16 in.....	Lansing.....	" "
644	" ".....		Board 8x16 in.....	" ".....	" "
645	" ".....			Birmingham.....	" "
646	" ".....				
647	" ".....				
648	" ".....				
649	<i>Salix petiolaris</i>		Block 6x¾ in.....	Lansing.....	Agricultural College.
650	" ".....				
651	" ".....				
652	" ".....				
653	" ".....				
654	" ".....				
655	<i>Salix sericea</i>				
656	" ".....				
657	" ".....				
658	" ".....		Block 6x1 in.....	Sanford.....	Agricultural College.
659	" ".....				
660	" ".....				
661	<i>Salix humilis</i>		Block ¾x6 in.....	Sanford.....	Agricultural College.
662	<i>Salix</i>				

662	<i>Salix</i>						
663	"						
664	"						
665	"						
666	"						
667	"						
668	"						
669	"						
670	"						
671	<i>Populus tremuloides</i>	American aspen	Block 6x6 in.	Lansing	Agricultural College.		
672	"	"	Board 2½x10 in.	"	"		
673	"	"	"	"	"		
674	"	"	"	"	"		
675	"	"	"	"	"		
676	"	"	"	"	"		
677	"	"	"	"	"		
678	"	"	"	"	"		
679	"	"	"	"	"		
680	"	"	"	"	"		
681	<i>Populus grandidentata</i>	Large-toothed aspen	Cross section 12 in.	Lansing	Agricultural College.		
682	"	"	Block 6x6 in.	"	"		
683	"	"	"	"	"		
684	"	"	"	"	"		
685	"	"	"	"	"		
686	"	"	"	"	"		
687	"	"	"	"	"		
688	"	"	"	"	"		
689	"	"	"	"	"		
690	"	"	"	"	"		
691	<i>Populus heterophylla</i>	Downy poplar.					
692	"	"					
693	"	"					
694	"	"					
695	"	"					
696	<i>Populus monilifera</i>	Cottonwood.	Block 6x6 in.	Lansing	Agricultural College.		
697	"	"	Cross section 24 in.	Monroe	C. E. Sumner.		
698	"	"	Board 8x16 in.	"	"		
699	"	"	" 6x16 in.	"	"		
701	"	"	"	"	"		
702	"	"	"	Saginaw City	Agricultural College.		
703	"	"	"	"	D. Hardin & Co.		

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
704	<i>Populus monilifera</i>	Cottonwood.			
705	" "	"			
706	" "	"			
707	<i>Populus angulata</i>	Angled cottonwood.			
708	" "	"			
709	" "	"			
710	" "	"			
711	" "	"			
712	" "	"			
713	" "	"			
714	<i>Populus balsamifera</i>	Balsam poplar, tacamahar			
715	" "	"			
716	" "	"			
717	" "	"			
718	" "	"			
719	" "	"			
720	" "	"			
721	" "	"			
722	" "	"			
723	<i>Pop. balsamifera var candicans</i>	Balm of Gilead.			
724	" "	"	Board 8x16 in.....	Sanford	Agricultural College.
725	" "	"	" "	"	"
726	" "	"	" "	"	"
727	" "	"	" "	"	"
728	" "	"			
729	" "	"			
730	" "	"			
731	<i>Pinus Banksiana</i>	Scrub pine or gray pine.	Cross section 13 in.....	Baldwin	Agricultural College.
732	" "	"	Block 6x6 in.....	"	"
733	" "	"	Board 8x16 in.....	Lake Co.	"
734	" "	"	" "	"	"
735	" "	"	Seeds.....	Traverse Co.	W. N. Adsit.
736	" "	"	Board 8x16 in.....	Lake Co.	Agricultural College.
737	" "	"			
738	" "	"			
739	<i>Pinus mitis</i>	Yellow pine.			
740	" "	"			

Pinus mitis.	Yellow pine.	Red or Norway pine.	Cross section 23 in.	East Saginaw.	Jesse Hoyt.
741	"	"	Board 7 1/2 x 19 in.	Baldwin.	Agricultural College.
742	"	"	Block 6x6 in.	East Saginaw.	Jesse Hoyt.
743	"	"	Board 7 1/2 x 19 in.	Saginaw City.	D. Hardin & Co.
744	"	"	"	East Saginaw.	Jesse Hoyt.
745	"	"	Board 8x16 in.	"	"
746	"	"	Board 7 1/2 x 19 in.	"	"
747	"	"	"	"	"
748	"	"	"	"	"
748 a	"	"	"	"	"
749	"	"	"	"	"
750	"	"	"	"	"
750 a	"	"	"	"	"
751	"	"	"	"	"
752	"	"	"	"	"
753	"	"	"	"	"
754	"	"	"	"	"
755	"	"	"	"	"
756	"	"	"	"	"
757	"	"	"	"	"
758	"	"	"	"	"
759	"	"	"	"	"
Pinus strobus.	White pine.	"	Cross section 23 in.	Baldwin.	Agricultural College.
760	"	"	Board 4x10 in.	Grand Rapids.	Phoenix Mfg Co.
761	"	"	Board 8x16 in.	Farwell.	Agricultural College.
762	"	"	"	"	Allen & Co.
763	"	"	"	"	"
764	"	"	"	"	"
765	"	"	"	"	"
766	"	"	"	"	"
767	"	"	"	"	"
768	"	"	"	"	"
769	"	"	"	"	"
770	"	"	"	"	"
770 A	"	"	"	"	"
771	"	"	"	"	"
771 A	"	"	"	"	"
772	"	"	"	"	"
772 A	"	"	"	"	"
773	"	"	"	"	"
773 A	"	"	"	"	"
774	"	"	"	"	"

*Cork pine.

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
774 A	<i>Pinus strobus</i>	White pine.....	Board 8x16 in.....	Grand Rapids.....	Nelson, Matter & Co.
775	"	"	"	"	"
776	<i>Abies nigra</i>	Black or double spruce.	Board 8x16 in.....	Lansing.....	Agricultural College.
777	"	"	"	"	"
778	"	"	Seeds.....	Traverse Co.....	W. N. Adsit.
779	"	"	"	"	"
780	"	"	"	"	"
781	"	"	"	"	"
782	"	"	"	"	"
783	"	"	"	"	"
784	<i>Abies alba</i>	White spruce.....	Cross section 7 in.....	Indington.....	Agricultural College.
785	"	"	Block 6x7 in.....	"	"
786	"	"	Board 4x10 in.....	"	"
787	"	"	"	"	"
788	"	"	"	"	"
789	"	"	"	"	"
790	"	"	"	"	"
791	"	"	"	"	"
792	"	"	"	"	"
793	<i>Abies canadensis</i>	Hemlock spruce.....	Cones.....	Rollin.....	J. O. Beal.
794	"	"	Block 6x6 in.....	Coleman's, Pr. M. R. R.	Agricultural College.
795	"	"	Cross section 25 in.....	"	"
796	"	"	Board 8x16 in.....	"	"
797	"	"	"	"	"
798	"	"	"	Coleman's.....	"
799	"	"	"	Farwell.....	"
800	"	"	Cones.....	Saginaw City.....	D. Hardin & Co.
801	"	"	"	Traverse Co.....	W. N. Adsit.
802	"	"	"	"	"
803	"	"	"	"	"
804	"	"	"	"	"
805	"	"	"	"	"
806	<i>Abies balsamea</i>	Balsam fir.....	Board 8x16 in.....	Lake Farwell.....	Agricultural College.
807	"	"	"	Farwell.....	"
808	"	"	"	"	"
809	"	"	"	"	"

LIST OF SPECIMENS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
S50	<i>Juniperus Virginiana</i>	Red cedar, savin.			
S51	" ".....	" "			
S52	" ".....	" "			
S53	" ".....	" "			
S54	<i>Juniperus Sabina</i> , var <i>procumbens</i>				
S55	<i>Taxus baccata</i> , var <i>canadensis</i>	Yew, ground hemlock.	Block 6x1 in.....	Little Traverse	Morrice & Crandall.
S55 a	" ".....	" "	Block 6x2½ in.....	" "	"
S55 b	" ".....	" "	Board 2x10 in.....	" "	Agricultural College.
S56	<i>Smilax rotundifolia</i>	Green brier.....	Block 6x¾ in.....	Lansing	" "
EXOTICS.					
S57	<i>Magnolia</i> .				
S58	<i>Berberis vulgaris</i>	Common barberry.....	{ Block 6x¾ in.....	Lansing	Agricultural College.
S59	<i>Tamarix gallica</i>	French Tamarisk.	{ Board 8x¾ in.....	" "	" "
S60	<i>Althea rosea</i>	Rose of Sharon.	3x6 inch block.....		
S61	<i>Tilia Europæa</i>	European linden.			
S62	" ".....	" "			
S63	" ".....	" "			
S64	" ".....	" "			
S65	" ".....	" "			
S66	<i>Citrus</i>	Orange and lemon.			
S67	" ".....	" "			
S68	" ".....	" "			
S69	" ".....	" "			
S70	<i>Ailanthus glandulosa</i>	Tree of Heaven, ailanthus	Cross section 16 in.....	Macon, Lenawee Co.	Israel Pennington.
S71	" ".....	" "	Board 8x16 in.....	" "	"
S72	" ".....	" "	" "	" "	"
S73	" ".....	" "	" "	" "	"
S74	" ".....	" "	" "	" "	"
S75	" ".....	" "	" "	" "	"
S76	" ".....	" "	" "	" "	"
S78	" ".....	" "	" "	" "	"
S79	" ".....	" "	" "	" "	"

880	<i>Ailanthus glandulosus</i>	'Tree of Heaven, ailanthus.	Block 6x3 $\frac{3}{4}$ in.....	Jackson.....	S. O. Knapp.
881	<i>Ithos cortinus</i>	Smoke tree.....	Board 2x10 in.....	"	Agricultural College.
882	"	"	"	"	"
883	"	"	"	"	"
884	"	"	"	"	"
885	"	"	"	"	"
886	<i>Rhamnus catharticus</i>	Buck-thorn.			
887	"	"			
888	"	"			
889	"	"			
890	"	"			
891	"	"			
892	"	"			
893	<i>Esculus hippocastanum</i>	Horse chestnut.			
894	"	"			
895	"	"			
896	"	"			
897	"	"			
898	<i>Acer</i>	Maple.			
899	"	"			
900	"	"			
901	"	"			
902	"	"			
903	"	"			
904	"	"			
905	"	"			
906	"	"			
907	"	"			
908	"	"			
909	"	"			
910	"	"			
911	<i>Robinia pseudacacia</i>	Locust.....	Cross section 19x13 in. Battle Creek	J. A. Robinson.	
912	"	"	Board 8x16 in.....	"	Agricultural College.
913	"	"	"	"	"
914	"	"	Board 4x10 in.....	"	"
915	"	"	"	"	"
916	"	"	"	"	"
917	"	"	"	"	"
918	"	"	"	"	"
919	"	"	"	"	"
920	"	"	"	"	"

LIST OF SPECIMENS—EXOTICS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
921	<i>Robinia pseudacacia</i> -----	Locust.			
922	"-----	"			
923	"-----	"			
924	"-----	"			
925	"-----	"			
926	<i>Prunus amygdolus-nana</i> -----	Flowering almond.			
927	"-----	"			
928	<i>Prunus amygdolus-Persica</i> -----	Peach.			
929	"-----	"			
930	"-----	"			
931	<i>Prunus domestica</i> -----	Plum.			
932	"-----	"			
933	"-----	"			
934	"-----	"			
935	"-----	"			
936	<i>Prunus cerasus</i> -----	Garden red cherry	Board 4x10 in.	Grand Rapids.	C. W. Garfield.
937	"-----	"			
938	"-----	"			
939	"-----	"			
940	"-----	"			
941	<i>Prunus avium</i> -----	Bird cherry.			
942	"-----	"			
943	"-----	"			
944	"-----	"			
945	"-----	"			
946	"-----	"			
947	"-----	"			
948	"-----	"			
949	<i>Pyrus communis</i> -----	Pear.			
950	"-----	"			
951	"-----	"			
952	"-----	"			
953	"-----	"			
954	<i>Pyrus malus</i> -----	Apple.	Block 6x4 in.	Lansing	Agricultural College.
955	"-----	"	Board 4x10 in.	"	"
956	"-----	"	"	"	"
957	"-----	"	"	"	"

958	<i>Pyrus malus</i>	Apple.....	Board 4x10 in.....	Lansing.....	Agricultural College.
959	" ".....	" ".....	" ".....	" ".....	" ".....
960	" ".....	" ".....	" ".....	" ".....	" ".....
961	" ".....	" ".....	" ".....	" ".....	" ".....
962	" ".....	" ".....	" ".....	" ".....	" ".....
963	" ".....	" ".....	" ".....	" ".....	" ".....
964	" ".....	" ".....	" ".....	" ".....	" ".....
965	" ".....	" ".....	" ".....	" ".....	" ".....
966	<i>Pyrus prunifolia</i>	Siberian crab-apple.....	Cross section 12 in.....	Lenawee.....	William Lamb.
967	" ".....	" ".....	Board 8x16 in.....	" ".....	" ".....
968	" ".....	" ".....	" ".....	" ".....	" ".....
969	" ".....	" ".....	" ".....	" ".....	" ".....
970	" ".....	" ".....	" ".....	" ".....	" ".....
971	<i>Cydonia japonica</i>	Japan quince.....	Block 1½x6 in.....	Lansing.....	Agricultural College.
972	<i>Cydonia vulgaris</i>	Common quince.....	" ".....	" ".....	" ".....
973	<i>Philadelphus</i>	Mock orange.....	Block ½x6 in.....	Lansing.....	Agricultural College.
974	<i>Liquidambar styraciflua</i>	Sweet gum tree.....	" ".....	" ".....	" ".....
975	" ".....	" ".....	" ".....	" ".....	" ".....
976	" ".....	" ".....	" ".....	" ".....	" ".....
977	<i>Aralia spinosa</i>	Hercules club.....	Block 5x6 in.....	Hudson.....	" ".....
978	" ".....	" ".....	Section 7 in.....	" ".....	" ".....
978 A	" ".....	" ".....	Board 4x10 in.....	" ".....	Agricultural College.
978 B	" ".....	" ".....	" ".....	" ".....	" ".....
978 C	" ".....	" ".....	" ".....	" ".....	" ".....
978 D	" ".....	" ".....	" ".....	" ".....	" ".....
978 E	" ".....	" ".....	" ".....	" ".....	" ".....
979	<i>Jecoma radicans</i>	Trumpet creeper.....	Block 1x6 in.....	Lansing.....	" ".....
980	" ".....	" ".....	Seeds.....	Jackson.....	S. O. Knapp.
981	" ".....	" ".....	" ".....	" ".....	" ".....
982	" ".....	" ".....	" ".....	" ".....	" ".....
983	<i>Catalpa bignonioides</i>	Catalpa.....	" ".....	" ".....	" ".....
984	" ".....	" ".....	" ".....	" ".....	" ".....
985	" ".....	" ".....	" ".....	" ".....	" ".....
986	" ".....	" ".....	" ".....	" ".....	" ".....
987	" ".....	" ".....	" ".....	" ".....	" ".....
988	" ".....	" ".....	" ".....	" ".....	" ".....
989	" ".....	" ".....	" ".....	" ".....	" ".....
990	" ".....	" ".....	" ".....	" ".....	" ".....
991	" ".....	" ".....	" ".....	" ".....	" ".....
992	" ".....	" ".....	" ".....	" ".....	" ".....
993	<i>Syringa vulgaris</i>	Common lilac.....	Seeds.....	Battle Creek.....	Mr. Day.
			Block 6x2 in.....	Lansing.....	Agricultural College.

LIST OF SPECIMENS—EXOTICS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
994	<i>Syringa vulgaris</i>	Common lilac.....	Board 1½x10 in.....	Lansing.....	Agricultural College.
994 a	".....	".....	".....	".....	".....
995	<i>Syringa Persica</i>	Persian lilac.....	Block 6x¾ in.....	".....	".....
996	".....	".....	".....	".....	".....
997	".....	".....	".....	".....	".....
998	<i>Ligustrum vulgare</i>	Privet.....	Block 2½x6 in.....	Lansing.....	Agricultural College.
999	".....	".....	".....	".....	".....
1000	".....	".....	".....	".....	".....
1001	<i>Morus alba</i>	White mulberry.....	Block 6x7 in.....	Lenawee Co.....	John R. Hawkins.
1002	".....	".....	Section 7 in.....	".....	".....
1003	".....	".....	Board 4x10 in.....	Rollin.....	J. O. Beal.
1004	".....	".....	".....	".....	".....
1005	".....	".....	".....	".....	".....
1006	".....	".....	".....	".....	".....
1007	".....	".....	".....	".....	".....
1008	".....	".....	".....	".....	".....
1009	".....	".....	".....	".....	".....
1010	".....	".....	".....	".....	".....
1011	<i>Maclura aurantiaca</i>	Osage orange.....	Block 6x4 in.....	Richland.....	Rev. E. H. Day.
1012	".....	".....	Board 4x10 in.....	".....	Agricultural College.
1013	".....	".....	".....	".....	".....
1014	".....	".....	".....	".....	".....
1015	".....	".....	".....	".....	".....
1016	".....	".....	".....	".....	".....
1017	".....	".....	".....	".....	".....
1018	".....	".....	Seeds.....	Jackson.....	".....
1019	".....	".....	".....	".....	".....
1020	".....	".....	".....	".....	".....
1021	".....	".....	".....	".....	".....
1022	<i>Salix Babylonica</i>	Weeping willow.....	Cross section 12 in.....	Lenawee Co.....	Agricultural College.
1023	".....	".....	Board 4x10 in.....	Rollin.....	".....
1024	".....	".....	Board 8x16 in.....	".....	".....
1025	".....	".....	".....	".....	".....
1026	".....	".....	".....	".....	".....
1027	".....	".....	".....	".....	".....
1028	".....	".....	".....	".....	".....
1029	".....	".....	".....	".....	".....

1030	<i>Salix Babylonica</i>	Weeping willow.			
1031	" ".....	" "			
1032	" ".....	" "			
1033	<i>Salix viminalis</i>	Basket willow.			
1034	" ".....	" "			
1035	<i>Salix alba</i>	White willow.....	Block 6x6 in.	Jackson.....	S. O. Knapp.
1036	" ".....	" "	Board 6x16 in.	" "	" "
1037	" ".....	" "	" "	" "	" "
1038	" ".....	" "	Board 4x10 in.	" "	Agricultural College.
1039	" ".....	" "	" "	" "	" "
1040	" ".....	" "	Board 8x16 in.	" "	" "
1041	" ".....	" "			
1042	" ".....	" "			
1043	" ".....	" "			
1044	" ".....	" "			
1045	" ".....	" "			
1046	<i>Populus alba</i>	White poplar.....	Block 6x6 in.	Lansing.....	N. Parmelee.
1047	" ".....	" "			
1048	" ".....	" "			
1049	" ".....	" "			
1050	" ".....	" "			
1051	<i>Pinus</i> .				
1052	" ".....				
1053	" ".....				
1054	" ".....				
1055	" ".....				
1056	" ".....				
1057	" ".....				
1058	" ".....				
1059	" ".....				
1060	<i>Abies excelsa</i>	Norway spruce.....	Cones.....	Lansing.....	Agricultural College.
1061	" ".....				
1062	" ".....				
1063	" ".....				
1064	" ".....				
1065	" ".....				
1066	" ".....				
1067	" ".....				
1068	" ".....				
1069	" ".....				
1070	<i>Larix Europea</i>	European larch.....	Seeds and cones.....	Lansing.....	Agricultural College.
1071	" ".....	" "			
1072	" ".....	" "			
1073	" ".....	" "			
1074	" ".....	" "			

LIST OF SPECIMENS—EXOTICS.—CONTINUED.

No.	Latin Name.	Common Name.	Description.	Locality.	Donor's Name.
1075	<i>Larix Europea</i>	European larch.			
1076	"	"			
1077	"	"			
1078	"	"			
1079	"	"			
1080	"	"			
1081	"	"			
1082	"	"			
1083	<i>Taxodium distichum</i>	Bald or southern cypress.	Block 1x6 in.	Lansing	Agricultural College.
1084	"	"			
1085	"	"			
1086	"	"			
1087	"	"			
1088	"	"			
1089	"	"			
1090	"	"			
1091	* Deer's antler in oak rail				Augustus Schmidt.
1092	† Pine curl or knot.			Galesburg.	Sanford Keeler.
1093	Oak knot—very large.			East Saginaw	Warren Brown.
1094	Natural graft in oak limb,— deer's antler in oak section.			Flint	
1095	Natural root graft.	Beech.		Greenville, Cass Co.	{ John E. Taylor. A. B. Wetherby.
1096	"	"			
1097	"	"			
1098	"	"			
1099	"	"			
1100	"	"			
1101		Chinese wistaria.	Scods	Adrian	B. W. Steere,
1102	Black ash mallet—J. Webster Childs—knot.	French walnut.	Board 4x10 in.	Grand Rapids	† Phoenix Mfg Co.
1103	<i>Juglans nigra</i>	Black walnut.		Lansing	|| D. G. Canfield & Co.
1104	Four specimens of vines around trees.				
1105	Shumac "blind"—Lansing—A. Allen & Co.				
1106	One board, bird's-eye maple—Petoskey—Agricultural College.				
1107	One beech limb, knotted—Agricultural College.				
1108	Twin beeches, united 25 ft. above ground, given by Geo. Rowell, Bennington, Oakland Co.				
1109	Section of cottonwood in four pieces. Also one piece about 3½ ft., from same tree, above stump—Joseph Bristol, Almont.				
1110	Box wagon timber from S. S. Scoville & Co., Coldwater—not opened.				
1111					
1112					
1113	Three large sections of maples given by Jackson, Lansing & Saginaw Railroad—grew at Otsego.				
1114	One large rock elm. given by Jackson, Lansing & Saginaw Railroad—grew at Otsego.				
1115					

STATE AGRICULTURAL SOCIETY.

PROCEEDINGS FOR THE YEAR 1876.

SECRETARY'S OFFICE, }
Pontiac, Mich., Dec. 19, 1876. }

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN:—I have the honor herewith to submit the detailed annual report of the proceedings of the Michigan State Agricultural Society for the year 1876.

Your obedient servant,

C. F. KIMBALL,
Secretary.

PROCEEDINGS OF THE EXECUTIVE COMMITTEE.

ANNUAL WINTER MEETING.

In accordance with the call issued by the President, the officers and members of the Executive Committee of this Society assembled at the parlors of the Russell House, Detroit, on Monday evening, December 20, and were called to order at 7:30. The roll was called and the following gentlemen answered to their names:

President—E. O. Humphrey, Kalamazoo.

Secretary—C. F. Kimball, Pontiac.

Executive Committee—George W. Phillips, E. W. Rising, Joseph M. Sterling, C. W. Greene, Wm. M. Ferry, A. O. Hyde, J. M. French, A. F. Wood, J. Q. A. Burrington, F. M. Manning, Wm. L. Webber, E. Van Valkenburg, D. W. Howard, H. O. Hanford, J. Webster Childs, R. G. Hart.

Ex-Presidents—M. Shoemaker, W. J. Baxter, Charles Kipp.

A quorum being present the President declared the meeting ready for business, and addressed the committee as follows:

Gentlemen of the Executive Committee and Members of the State Agricultural Society:

For the repetition of your kindness and confidence permit me to thank you. We are again met in the interests of the State Agricultural Society, to review the past and plan, revise, and arrange for the coming year.

These meetings, to me, have become occasions of very great pleasure as well as profit.

Yes, gentlemen, each time as I meet you, exchange greetings and listen to words that are cheering and instructive, I am inspired with new zeal, and when I part with you am better and wiser than before.

Agricultural, mechanical, and industrial pursuits are the foundation of all human life and prosperity. Without them we could not maintain our individual or national existence for a day. Thus you can see the importance of the work in which we are engaged. Our mission as a society is to promote the best interests of our people by an interchange of thought and practical experience and by our association and fairs bring our industrial classes together, that they may become acquainted with each other's mode of culture and products throughout our whole State, that they may have the fullest benefit of its ample resources.

Prior to the commencement of the present century there was but little agricultural progress in the United States. The first settlers had many and great difficulties to encounter in clearing the land, in bringing it under cultivation and in defending themselves against the encroachments of the Indians, besides the French and Revolutionary wars very much interfered with the peaceful pursuits of agriculture, nor could the people after peace was restored, burdened with debt, without money to pay their taxes, with no manufactories and no foreign demand for breadstuffs, be expected to make much progress in tilling the soil. But a few years ago the idea of scientific and experimental agriculture was ridiculed. But now the ideas of men are changed, inventions and experiences of thinking men are recognized and accepted as for our general good. Great and manifold progress has been made. We have our Agricultural College with its experimental farm. Its practical teachings fits the student for the most enlarged and successful ideas of agriculture, and its influence is being felt and appreciated by us all. We have our agricultural journal, the *Michigan Farmer*, which should be read by every farmer in our whole country. We have had vast and wonderful inventions of approved implements and machinery, which has very materially lightened our burdens, and the rotation system of cropping and tile drainage. Mr. John Johnson, near Geneva, N. Y., who was at one time esteemed a fanatic by his neighbors, has come of late years to be known as the father of tile drainage in America. Fifty years ago Mr. Johnson came from Scotland to this country, and planted himself on the eastern shore of Seneca Lake, with a determination of making agriculture the end and aim of his life, and to use all the means in his power to promote its success. He adopted a system of deep plowing, manuring and tile drainage which he resolved to carry out according to his plan. At that time there were no machines for manufacturing the tile. They had to be molded by hand and bent over a stick. This slow process made them very expensive. Notwithstanding this he determined to use them, his ditches were opened and his tile laid while his neighbors ridiculed him,—thought him a poor deluded man. Some went and consulted with him, all the while watching for signs of lunacy, and one and all said he was a consummate fool to put his crockery under ground and bury his money so fruitlessly. Mr. Johnson says he really felt ashamed of himself, and was almost ready to conceal his crime. But what was the result? That land that had been previously sodden with water and utterly unfruitful in one season was covered with luxuriant crops, and the jeering skeptics were utterly confounded, and as the fame of his success went forth one and another duplicated his experiment and were rewarded according to their deserts, and Mr. Johnson was extolled as a public benefactor. Such has come to be our remarkable facility for adaptation to new circumstances that the total loss of any product, however important, will ever be compensated for by some new development of productive industry. In the formation of a national education the country more than the city must control. While in the city the favored few enjoy superior facilities, and attain scholarly reputation surpassing most people in the country, they are but the few. There are sections of every city which are nurseries of barbarism. These sections increase with the growth of the cities, and I fear, also, as time advances, in proportion to the population of our whole country. It is to be regretted that there has been for the past few years a growing desire among farmers to leave their farms and flock to the cities, and what can induce them to leave their beautiful farms, fields and herds, homes that are embellished with everything that can add a charm or comfort to life and crowd into the dirt and bustle of the city is more than I am able to conceive.

The exhibition at our fair of the present year, at Saginaw, I am glad to be able to say, was very creditable, surpassing in several of the departments any of our previous fairs, and had it not been so materially interfered with by the excessive rains, I have no doubt but our receipts would have been ample to have paid the premiums and annual expenses of our society and something more. But, notwithstanding we have been necessitated to draw largely from our surplus, I am gratified to know that the financial condition of the society is still solvent.

I wish to say one word in behalf of exhibitors. It is well known by us all that it is with the greatest amount of labor, anxiety, and exposure of their property that exhibitors patronize our fairs, and, while we think it an object for them with all they have to contend with to attend the fairs, we know it is an object for us to have them there, for we could have no fair unless animals and articles were placed on exhibition. I therefore deem it of the utmost importance that we should use every means in our power to make the task easy and pleasant as possible for them.

Our premium list I believe to be liberal,—fully as much so as is profitable for the society, and I would not recommend any increase as a whole to the list. I look upon the speed department of our fair with no more favor than I did a year ago; would be glad to see it stricken from our list, as I sincerely believe it to be a kind of business which we should not encourage. The pool stand, which seems to be a necessary appendage for the pleasure and profit of that department, was in full blast on a conspicuous part of the ground at our fairs, and I must say it annoyed me exceedingly. It does seem to me that in this enlightened and progressive age pool selling should not be tolerated by our society. It is a disgrace to our fair, a disgrace to our State, and a burning disgrace to you and to me to allow it; and I here and now enter my most earnest and solemn protest against any such proceedings being permitted on our fair grounds in the future. The object of this society, as I understand it, is to improve the condition of our fellow man. It is an educator either for good or evil. If our examples are what they should be we may expect good results. If they are bad we may expect bad results; and we, gentlemen, are responsible for these results. A damnable example is worse than no example at all, and it seems to me that you should give this subject your most earnest and candid consideration.

It is with special satisfaction that I speak of the pomological department. I think we have all of us been growing more and more interested in the workings and grand achievements of the men that have been engaged with such wonderful energy in the advancement of this important branch of industry. Their success at Chicago and the exhibition at our own State Fair was very satisfactory, as well as gratifying to all, and I do believe their successful efforts demands of us all the encouragement it is possible for us to bestow.

The centennial is near at hand, and I fear we are not giving it that attention which so rare an occasion demands of us; and I would suggest that it shall be a part of the business of this meeting—and an important part—to instruct and provide our Centennial Committee with sufficient means, that they may be able to coöperate with other committees of the State, and thus jointly be enabled to make such an exhibition at Philadelphia of the products of Michigan as will do us credit, and that we shall remember with pride. The evidences of European interests in the centennial are gratifying, and should inspire our own people to renewed endeavors to make it a success worthy of the nation and the anniversary; and I desire to impress upon the members of this committee and upon all friends of the industrial interests of this State the importance of urging our people to send to the exposition a full assortment of their respective products. This is our opportunity, and should we not meet it I fear it will ever be regretted. Who of us can expect to celebrate a second centennial?

Mr. Baxter moved the appointment of a committee of three upon the President's address, to assign the several subjects therein treated to the appropriate committees.

Adopted.

The President appointed Messrs. Baxter, Webber, and Ferry as such committee.

The Secretary presented the annual report of the Society for the current year and proceeded to read the same, when on motion of Mr. Baxter, the reading of the minutes of the Annual Winter Meeting, at Pontiac, was omitted, and the proceedings of the several meetings at East Saginaw, was proceeded with, and completed.

Col. Wm. M. Ferry called for the reading of the resolution offered by Mr. Baxter, and adopted at the Pontiac meeting, making appropriations to the State Pomological Society; and the resolutions were read. Col. Ferry called for the reading of the report of the Centennial Committee, adopted at East

Saginaw, appropriating two thousand dollars (\$2,000) for Centennial purposes; and the report was read.

Col. Ferry stated that it was his opinion that there was another resolution, adopted at East Saginaw, appropriating a sum of money to the Pomological Society for Centennial purposes, which did not appear upon the records. The Secretary stated that such action or resolution was not had or adopted to his knowledge.

The further consideration of the record was postponed, and Mr. Phillips having called for the reading of the Constitution of the Society, it was read by the Secretary.

On motion of Mr. Webber, which was adopted, Mr. Baxter was appointed a committee of one to report to the committee such amendments as had been made to the constitution of the Society since its publication in 1857.

A bill from the East Saginaw Driving Park Association was presented, and on motion referred to the Business Committee with instructions to report upon the same.

On motion adjourned to meet at nine o'clock Tuesday morning.

C. F. KIMBALL, *Secretary*.

Approved.

Tuesday, December 21, 1875.

The Executive Committee was called to order by the President.

Roll called: quorum present.

The committee to whom was referred the President's address, for apportionment of subjects would recommend as follows:

1st. So much as refers to the finances of the Society, be referred to the Committee on Finances.

2d. So much as refers to facilities and conveniences for exhibitors, be referred to the Business Committee.

3d. So much as refers to premiums, be referred to Committee on Premium List.

4th. So much as refers to revision or discontinuance of premiums in Speed Department, to special committee of three (3), with instructions to report as early as practicable, that full discussion may be had and the policy of the Society in this matter be definitely settled.

5th. That so much as refers to the action and exhibition of the Pomological Society, in connection with and as a department of this Society at its annual fair, be referred to a special committee of three, with instructions to confer with a like committee from the Pomological Society, who are to be present and to report as early as practicable.

6th. So much as refers to the centennial and the action of this society in this matter be referred to the committee of the whole.

W. J. BAXTER,
Chairman.

Mr. Baxter, as a committee upon amendments to the constitution, made a report, which was received and read.

Mr. Childs moved that the report be recommitted with instructions to report as near as may be what constitutes the present constitution of the society and the proofs at hand in regard to the adoption of amendments thereto.

Mr. Baxter asked leave to withdraw the report with the privilege of reporting at a future date.

Granted.

Mr. Whitney offered the following resolution, which, on motion, was adopted:

Resolved, That a committee of five be appointed, of which Mr. Webber shall be the chairman, to draft a revised act of incorporation to be presented to the Legislature for adoption; also to draft a constitution and by-laws for this society in accordance therewith; said acts and constitution to be printed in the Premium List for the year 1876, and reported to the Executive Committee at its next meeting for its adoption and submission to the annual meetings of the Society.

Mr. Sterling from the Business Committee reported upon the bill of the East Saginaw Driving Park Association, and offered the following resolution, which was adopted:

Resolved, That the contract of 1874 and the contract of 1875 between the State Agricultural Society and the East Saginaw Driving Park Association, also the bill of said association, and the business order in their favor for \$322.65, being amount claimed by said association for sitting in the grand stand, be placed in the hands of Mr. Webber with instructions to settle them in accordance with the terms of the contract.

The demands of Mr. Pitts of Jonesville for premium, being just award for broadcast seed drill, omitted on awarding committee report, was referred to Superintendents Hanford and Angel.

The Secretary presented the list of the discretionary awards made at the State Fair, which, on motion, was referred, by divisions, to the several superintendents respectively, with instructions to report upon the same.

The President appointed the following standing committees:

On Finance.—Messrs. Childs, Ramsdell, and Van Valkenburg.

On Rules.—Messrs. Webber, Hanford, and Ferry.

On Premium List.—Messrs. Greene, Manning, Phillips, Howard, and Wood.

Adjourned till 2 o'clock P. M.

C. F. KIMBALL, *Secretary*.

Approved.

Afternoon Session, December 21, 1875.

Roll called: quorum present.

A dispatch from Mr. Avery was received by the President announcing his inability to be present.

The President appointed the following special committees as per resolution of the Board:

On Pomology.—Messrs. Shoemaker, Kipp, and Baxter.

On Constitution and By-Laws.—Messrs. Webber, Childs, Whitney, Kimball, and Hart.

On Speed Premiums.—Messrs. Sterling, Hyde, and Dean.

Mr. Hanford reported upon discretionary premiums in Division F, and the reports were adopted and the awards ordered entered upon the register and paid; also in favor of paying first premium in broad-cast seeders to Wm. F. Platt, of Jonesville, entry No. 20, Class 35, \$40.

Col. Ferry reported upon the discretionary premiums awarded in Division H, machinery, which report was received, adopted, and the award ordered paid accordingly.

Mr. Baxter submitted his report of the amendments to the constitution made since the publication of this instrument in the Agricultural Report of 1857. Mr. Webber moved that the report be received and adopted as a settlement of the question referred to the committee. Adopted. The following is the report:

Your committee would respectfully report that the last full reprint of the constitution he is able to find was in 1859, which is the same as published in 1857, with

exception of Article No. 2, by which the number of the executive committee was made fourteen instead of twelve.

Section 2 was further amended at annual meeting at Kalamazoo, September 23, 1870, in pursuance of a notice to that effect given at the annual meeting at Jackson in September, 1869, but of which notice your committee can find no record. The following resolution was adopted:

Resolved, That the constitution of this Society be so amended as to make executive committee consist of twenty members, and that half be elected annually, to hold their office for two years, and that one-half the additional members elected upon this change in the constitution be elected for one year and the other half for two years.

Your committee would also report that said article was also changed at an annual meeting of the Society held at the fair ground, on Woodward Avenue, in the city of Detroit, in amendment, with a notice given two years previous thereto, on the same grounds, so as to read: 'If any member of the executive committee shall fail to attend two successive meetings of said committee, duly called, and of which he shall have had notice, without reasonable excuse, satisfactory to the committee, his office shall be declared vacant, and the vacancy shall be filled by the executive committee.' Your committee cannot give the year when the change was made, nor can they find any report of the same, but would say, from recollection, that it was made the last year H. G. Wells acted as President of said Society. The committee can find no record, and cannot speak with certainty of any further changes in the constitution, and therefore, while under the impression that the same has been changed, Art. 10, by doing away with life membership, and Art. 13 by requiring written notice of any proposed amendment to the constitution to be given at some regular meeting of the Society previous to meeting at which action shall be taken, still, as no record exists of such changes, if made, and no evidence of the same, except from indistinct recollection of members, and the usual custom and action of the Society in these particulars, they deem it safer to consider the constitution on these points to be as printed.

Respectfully,

W. J. BAXTER, *Chairman*.

Wednesday Morning, December 22, 1875.

Committee called to order by the President at 9 o'clock. Roll called: quorum present.

Minutes of Tuesday's meeting read and approved.

Mr. Webber presented the garnishee judgment from the Oakland Circuit in favor of First National Bank of Pontiac, as against indebtedness of the Society for premiums awarded J. C. Deyo, of Jackson, and moved that the orders for Deyo's premiums be delivered to the First National Bank of Pontiac in accordance with the judgment at the general term of the circuit court for the county of Oakland, continued and held at the court house in the city of Pontiac, in said county of Oakland, on Tuesday, the 21st day of December, in the year 1875. Motion adopted.

Mr. Webber presented the following resolution, which was adopted:

Resolved, That it having been rumored that, possibly by reason of this being the centennial year, this Society might not hold its annual fair in the autumn of 1876, and the constitution governing the Society expressly providing for annual fairs, to the end that no misapprehension may exist on the subject, it is declared that the annual fair for 1876 will be held as usual.

Mr. Sterling, from the Business Committee, reported upon the expense of 1875, which report was received and referred to the Finance Committee.

Mr. Sterling, from the committee to whom was referred the subject of a Speed Department, reported as follows:

To the President and Executive Committee of the Michigan State Agricultural Society:

We, the undersigned, a special committee appointed to consider and report upon so

much of the President's annual address as relates to the Speed Department of the State Fair, respectfully report that we have had the same under consideration and are unanimously agreed—

That the speed department as heretofore conducted is objectionable and ought not to be continued by the Society, and owing to the great difficulty of continuing this department and keeping it within honorable limits, we recommend that all premiums for speed proper be stricken from our premium list.

J. W. STERLING,
J. G. RAMSDELL,
A. O. HYDE.

The adoption of the report was moved, and the yeas and nays called for.

Mr. Greene offered the following amendment to the report:

Resolved, That there is nothing in the foregoing report which shall be regarded as discouraging the trials of speed of Michigan horses at the State Fair under suitable rules and regulations.

The yeas and nays being called for, the amendment failed by the following vote:

Aye.—C. F. Kimball, C. W. Greene, J. M. French, E. Van Valkenburgh, R. G. Hart, and M. Shoemaker—6.

No.—E. O. Humphrey, A. J. Dean, George W. Phillips, E. W. Rising, J. M. Sterling, Wm. M. Ferry, A. O. Hyde, C. L. Whitney, J. G. Ramsdell, A. F. Wood, J. Q. A. Barrington, F. M. Manning, W. L. Webber, Abel Angel, D. W. Howard, H. O. Hanford, J. Webster Childs—17.

The report of the committee was then adopted by 18 yeas and 5 nays.

A communication inviting the Executive Committee and officers of this Society to attend a meeting of the Detroit Scientific Association this evening was read and the invitation accepted.

The committee on rules and regulations governing at the exhibition at the State Fair reported, and the report was read and adopted, as follows:

GENERAL RULES AND REGULATIONS.

I.—MEMBERS.

1. Any person may become a member of this Society by paying one dollar into the treasury. He will receive an annual certificate of membership, and two admission tickets.

2. Members are entitled to the privileges of voting and holding office, and competing for all premiums in any department without further payment, except the herd and special prizes, as hereinafter provided.

3. Persons who were life members of the Northern Michigan Agricultural and Mechanical Society, and hold and present certificate as such, will be entitled to all the privileges of annual members, and their wives, and children under eighteen years of age, living in the family, will be entitled to admission to the grounds.

II.—OFFICERS.

1. The Executive Committee will meet at the office of the Secretary, on the evening of each day of the Fair, at 7½ o'clock P. M., to transact such business as may be brought before them, and to hear reports of Executive Superintendents.

2. The Secretary's office will be on the Fair Grounds, each day of the Fair, where all business of his department will be transacted.

3. The President's and Superintendents' office, during the days of the Fair, will be on the Fair Grounds.

4. The office of the Marshal will be near the entrance gates, and distinguished by a red flag.

5. The office of the General Superintendent of the grounds during the fair, will be at the President's office.

6. Officers will be designated by ribbon badges, with the name of the office printed thereon.

7. Each department will be in charge of one or more members of the Executive Committee, and exhibitors and judges will apply to such Superintendent for instructions in his department.

8. It shall be the duty of each Superintendent in charge of a department at the annual fair of this Society, to present to the Executive Committee at the Winter Meeting succeeding each fair, a written report upon the exhibition in his department, which reports shall form a portion of the proceedings of the Society and be published therewith.

9. The Executive Committee will be in session on the fair grounds at nine o'clock A. M., each day, for the transaction of business. They may confirm the nominations of all assistants made by the members of the Executive Board in charge, and give general direction to the exhibition, and see that the published rules are executed.

10. The annual election of officers will take place on Thursday of the week of the Fair, and will be conducted as follows:

ELECTION OF OFFICERS.

Resolved, That in all future elections for officers of this Society, the elections shall be conducted in the following manner, viz.:

The executive committee shall provide a proper ballot box to be kept at some convenient place on the fair grounds, and they shall appoint three proper persons, who shall conduct the elections and receive the ballots of all members who are entitled and shall offer to vote, and said judges shall require each person offering to vote to present the proper certificate of membership, and shall keep a full register of the names of all persons voting at such election. The polls of said election shall be open at nine o'clock A. M., and be closed at five o'clock P. M., on Thursday of the week of the annual fair. In case of a tie vote the judges shall decide the matter in the manner provided by law for deciding the tie votes at township elections. The judges of the election, together with the President of the Society, shall duly canvass the votes so cast and shall publicly announce the result from the grand stand on the fair ground at 10 o'clock A. M. of the next succeeding day.

Resolved, That due notice of such election shall annually be given by the Secretary in the posters and regular advertisements of the fair, and conspicuous notices of the place where such polls shall be held shall also be posted on the grounds.

In accordance with the above resolutions of the Society, adopted at the annual meeting at East Saginaw, 1875, the Executive Committee have adopted the following rules to govern elections:

1. The Executive Committee shall, on the first day of the fair, appoint three persons who shall be members of the Society, to act as judges of the election, and shall at the same time fix the place on the fair grounds where the election shall be held.

2. Notice of the names of the judges and the place where the polls will be held shall be given on the second day of the fair, by publication and posting of notices in at least twenty prominent places on the fair grounds.

3. All the names to be voted for of the officers to be elected shall be on one ticket.

4. Each member desiring to vote shall present a membership ticket, which ticket the judges of election shall stamp, to show that the same has been voted upon, and the judges shall also take the name of the voter and register the same in a poll list, and shall then deposit his ballot in the box provided for that purpose.

5. The polls shall be opened promptly at nine o'clock on the morning of Thursday, of the fair week. If at that time any of the judges appointed shall not be present, the President shall immediately appoint from the members of the Society to fill the vacancy or vacancies.

6. Each of the judges shall, before entering upon the performance of his duties, subscribe a declaration that he will faithfully and impartially act as a judge of such election, and such declaration shall be filed with the Secretary.

7. No qualification shall be required to entitle any one to vote, other than the presentation of a certificate showing membership in this Society.

8. At 5 o'clock P. M. of the day of election the polls shall be closed, and the judges and President shall then and there at once proceed publicly to canvass the votes, and shall there, before adjournment, decide who are elected to the several offices.

9. The person having the highest number of votes for the office of President shall be declared elected, and a like rule shall be observed for the offices of Secretary and Treasurer. The persons voted for as Executive Committee, to the number to be elected, having the highest number of votes, shall be declared elected, *i. e.*, if there be ten members of the Executive Committee to be elected, the ten persons having the highest vote respectively shall be the ones elected.

10. The vote as declared by the President and judges of election shall be announced the next day as required by the by-laws.

11. Poll lists shall be made to agree with the count of ballots; votes folded together, and fraudulent and duplicate votes shall be governed by the rule prescribed by law for the government of township elections.

III.—ADMISSION.

1. The gates will be opened at eight o'clock A. M. of each day, at which time every officer and employé is expected to be at his post of duty.

2. Single tickets of admission at 50 cents each, and tickets for children under sixteen years of age, at 25 cents each, will be for sale at the Treasurer's office. All tickets will be taken up at the gate, as they are good for one admission only. Children under eight years of age free.

3. One horse and rider must have two tickets; one horse, carriage and driver, two tickets; two horse vehicle and driver, three tickets. For each person other than driver, in any vehicle, one ticket will be required.

4. Admission to the grand stand will be 25 cents for each admission. Children under eight years free. The grand stand will be cleared by the police and swept during the recess from 12:30 to 1:30 P. M., each day.

5. Editors and reporters will obtain tickets of admission from the President. Those who are strangers will please present a written introduction from the proprietors or editors of the city papers.

IV.—EXHIBITORS.

1. Competition is open to all, regardless of locality, unless otherwise specially provided.

2. Exhibitors must be members of the Society. Those making their entries by letter will remit the amount of the membership fee, \$1.00, with their entries to the Secretary.

3. Entries made by letter in advance of the fair should be addressed to the Secretary at Pontiac up to September 1st, 1876, after that at the Secretary's office up to twelve o'clock on the second day of the fair, at the place of holding the fair.

4. As the fair opens upon Monday, officers of the Society will be in their respective places at the fair grounds on Friday and Saturday of the week previous to the fair, to receive entries and arrange articles. To avoid hurry and confusion the entries should, as far as possible, be made the week before the fair.

5. Each exhibitor will be expected to have each animal or article entered and in its proper place on the grounds by the close of the first day of the fair. No animal or article will be examined for a premium which shall not be duly entered by twelve o'clock on Tuesday, the second day of the fair, and on the grounds by the evening of said day. This rule shall not be varied, except it is shown that an unavoidable delay has been caused by accident, or circumstances beyond control of exhibitor.

6. Persons entering live stock must at the time of entry give a list of the stock, stating the age and breed of the animals, the breeder's name and residence, if known, and the particular class and division in which the animal is to be entered; and in case of thorough-bred, cross-blooded, or half-breed animals, full pedigrees, duly certified, must be filed at the same time.

[NOTE.—An authenticated pedigree or statement of breeding should contain an affidavit of the breeder, stating the description of the animal, with the date of its birth, and the date of its sale, if out of his hands, and the names or description of its sire or dam.]

7. Copies of the premium list and blank forms for entries will be furnished on application to the Secretary. Exhibitors should make themselves acquainted with the premium list and requirements, and be sure in what class and division their entries properly belong, as it will be the duty of the judges to rule out any animal or article not answering to the entry. No change or alteration is permitted after the books are placed in the hands of the committees. Entries may be made for exhibition without competition, and viewing committees in the several classes may notice such as they shall deem worthy in their reports. But all entries must be made by members of the Society. Except for the herd and sweepstake premiums, no animal or article can be entered in more than one class, or compete for more than one premium.

8. The Society reserves the right to refuse any entries offered, particularly such as require an unreasonable amount of room. All exhibitors must (except in the case of live stock) state at the time of entry the space required by them, in order that proper quantity of space may be reserved.

9. Goods and stock must be delivered on the grounds and put in place by exhibitors and removed by them at the close of the fair. No animal or article may be removed

from the show ground without permission of the Superintendent until the close of the fair. A transgression of this rule will incur forfeiture of any premium awarded. Stock going to a distance may be removed on Friday by obtaining permission of the Superintendent in charge.

10. Exhibitors wishing to erect separate buildings, and exhibitors requiring additional work in buildings or elsewhere, must apply to the President. In all such cases the exhibitor must bear the expense.

11. Exhibitors will not be allowed to sell goods during the Fair without special permission of the General Superintendent (though they may receive and book orders, and all articles or animals may have the price of each attached), nor will they be permitted to call attention to their wares in a noisy or disorderly manner.

12. All protests must be made in writing; must state specifically the cause of complaint or appeal, and must be for some cause other than errors of judgment on the part of the Committee. Such protest must be filed with the Secretary on or before the last day of the Fair. No complaint or appeal based on the statement that the awarding committee have overlooked animals or articles will be considered, and all awards will be deemed final unless appealed from under this rule.

13. All entries must be made in the name of the owner, or the name of the joint owners, actual growers, producers, inventors, or manufacturers. The penalty for transgression of this rule will be exclusion from the present and all future exhibitions of the Society.

14. The name and residence of the exhibitor will be placed on the entry card attached to the article or animal exhibited, but no advertising placards shall be placed on articles exhibited for competition.

15. Implements and machines not competing for premiums may be labeled with the name of the exhibitor, name of the machine, its use, and the retail price.

16. Every article or animal upon the fair grounds will be under the control of the Executive Committee, and every precaution will be taken for their safe keeping, but the Society will not be responsible for any damage or loss that may occur, and upon this condition entries are received.

17. Exhibitors, having articles or animals on exhibition which require their constant supervision, care, and attention, will be furnished with entrance tickets on application to the Superintendent in charge of the several departments, at such Superintendent's discretion, which tickets will be taken up on presentation at the gate.

18. The entries in the several departments shall be arranged, as nearly as possible, as follows:

Cattle.—In the stables assigned them, the several breeds as nearly as practicable ranged together.

Sheep and Swine.—In the pens according to their breeds.

Horses.—In the stables as they may be assigned by the Superintendents of the horse department, with open doors in the daytime, unless the Superintendent in charge shall, in his discretion, allow the doors to be closed.

GENERAL RULES FOR LIVE STOCK—SHEDDING AT DISCRETION OF SUPERINTENDENT.

1. No animal may compete for more than one prize in any class or division, except for the herd or sweepstakes premiums.

2. Prize animals at prize exhibitions may compete on the same terms as other animals.

3. Stock, to compete for premiums, must be exhibited by the owner or his agent. Any violation of this rule will be punished by the withdrawal of any award that may have been made.

4. Each animal will be required to be placed on the ground in the division to which it belongs by the agent or owner who has it in charge, and in the place assigned to it by the officer of the Society having charge of that department.

5. Stalls, stables, and pens are provided for live stock; but where room cannot be made, then the Superintendent may permit such animals to have admission to the grounds at such times as he may deem proper. Places may be assigned in the order of application. No loose animals shall remain on the grounds.

6. Hay, straw, and water are provided for live stock on the grounds, free of charge, from the Saturday preceding to the close of the fair. Grain and feed will be provided for sale on the grounds at the usual market rates.

7. Copies of pedigrees will be required from all exhibitors, and statements as to breeding, feeding, and treatment of stock, to be given to the chairman of the Viewing Committees.

8. Horses or other stock occupying stalls or pens must be entered on the books of

the Secretary for exhibition, and if not shown in competition when called for by the awarding committee, will be charged one dollar per day for the time the stall or pen is occupied.

9. Grooms must be neatly and cleanly dressed when they lead out their stock for exhibition.

10. No persons other than the judges will be permitted to go into the rings where the stock is exhibited, except the officers of the Society or the Marshals, except upon the invitation of the Superintendent in charge.

CATTLE.

11. In all cases of thoroughbred cattle, only those of approved pedigree will be permitted to compete. The Society have appointed a committee on pedigree, viz.: A. F. Wood, of Mason; I. H. Butterfield, Jr., of Lapeer, and G. W. Phillips, of Romeo. All animals of approved pedigree will be considered equal as to pedigree, no over strain of pure blood having preference over another in the prize ring.

12. All three year old heifers in the several classes of thoroughbred cattle as breeding stock, shall be required to have borne a calf previous to the exhibition, or the heifer cannot compete.

13. Examination of cattle will take place on Wednesday, from one o'clock P. M., and during the forenoon of Thursday, from nine o'clock till two in the afternoon.

14. Bulls more than a year old must be secured by a ring in the nose, and otherwise secured to the satisfaction of the Superintendent, or they will be debarred from remaining on the ground.

HORSES.

15. Horses, to compete for premiums, must be sound, except in cases of stallions or mares injured by accidents which do not impair them for usefulness.

The committee on pedigree of horses is W. G. Patterson, of Kalamazoo, and E. Van Valkenburgh, of Hillsdale.

Exhibitors of horses will be required to test the animals they may exhibit, under the direction of the several committees which may have charge of the class in which the entries are made. Strict obedience to the directions will be required, as the committee have full power to rule out of competition all who do not comply with their requirements.

16. Horses possessing no merit, and entered only for the purpose of procuring stable room, may be ordered off the grounds by the Superintendent, and the entry money for such stock will be forfeited.

17. The committee having charge of the trials of the several horses, will have full possession and command of the track during the time of such trial, and marshals will be at their command for all purposes of order and enforcement of the rules.

SHEEP.

18. Sheep must, in all cases, have been evenly and closely shorn, not earlier than the first of April before the fair, and the date of shearing must be certified at the time of entry. If not evenly shorn, or if clipped so as to conceal defects, or with a view to improve their form or appearance, they will be excluded from competition.

Ewes competing for premiums, if over two years old, must have had living lambs the last spring, and suckled lambs for three months during this season. The fact must be certified and evidence furnished if required.

Special rules and regulations for the government of committees and exhibitors are attached to several classes, for convenience of reference, and attention is directed to them.

V.—AWARDING OR VIEWING COMMITTEES.

1. The Awarding Committees are requested to report, as soon as they arrive upon the grounds, to the Superintendent of the Division in which they are to serve, who will record their presence and inform them when their committee will be called upon to act.

2. On entering upon their duties, Awarding Committees will receive their badges, committee books, and instructions relative to their work from the Superintendent in charge, to whom they will apply in all cases of doubt or difficulty.

3. Superintendents in charge will appoint the time for each committee to act; they will fill all vacancies in committees, and when the reports are finished they will be returned to the superintendents.

4. Each superintendent in charge will see that the committee upon each class in his department report fully upon each article or animal in each class. The committee may make such remarks as they may deem proper. This is needed to secure a full report of the exhibition to be published in pamphlet form.

5. Committees will examine the premium list with care; they will in no case award a premium where there is no merit, though there be no competition, and in cases of partial merit, 2d or 3d premium may be awarded, though no 1st or 2d premium be given. They are requested to make such recommendations as circumstances or their experience may suggest, and recommend discretionary premiums, of which notice shall be given to the exhibitor; but all discretionary or special premiums shall be reported to the Executive Committee, and shall be approved by them before being announced as awarded.

6. Awarding Committees will be particular to have the number of awards, etc., entered in their books correctly, and when they have made their report they shall sign the same and hand it to the Superintendent in charge as soon as possible. The Superintendent will examine the same, and if any omissions have been made the report will be returned to the committee for further examination and report.

7. Awarding Committees are specially requested to do full and ample justice (impartial) both to the exhibitors and to the Society, observing that it is not the purpose of the Society to award unmeritorious exhibitions in any department, but to do full and ample justice to the meritorious.

8. No person or persons will be allowed to interfere with Awarding Committees in discharge of their duties.

9. Awarding Committees on Cattle and Horses will please have the prize ribbon tied upon the animals before sending them from the rings, and all prize ribbons will be placed upon the animals or articles by the committee, as soon as practicable after the awards are made.

10. No Executive Superintendent shall fill any vacancy in a committee on a class in which he is an exhibitor, and any vacancy on such a committee shall be reported to the President, and shall be filled by the President. No exhibitor can act as one of the Viewing Committee in any class in which he is a competitor, or in which he is in any way interested.

VI.—PREMIUMS.

1. The award of premiums will be designated as follows: First premium by a blue ribbon or card; the second premium by a red ribbon or card; and third by a white ribbon or card; a special premium by a yellow ribbon or card; discretionary premiums to be by a card prepared for that purpose.

2. The Society reserves the right to withhold the premiums in every case in which it shall appear to the Executive Committee that the regulations have not been complied with, or that fraud or deception has been practiced or attempted.

3. Premiums are payable in cash. The medals and diplomas will be delivered by the Secretary as soon as possible after the fair. Premiums will be paid by the Treasurer upon presentation of premium check drawn by the Secretary and countersigned by the President.

VII.—BOOTHS AND SHOWS.

When booths or grounds are leased, no admission tickets for lessees or assistants shall be given, nor shall any teams or employés with supplies be admitted between 8 A. M. and 6 P. M., during the fair, without regular admission tickets.

VIII.—BILLS AND CLAIMS.

Persons having claims against the Society must present them to the Secretary before the close of the fair. If there are any claims not then presented they will not be acted upon until the annual meeting in January. No claims will be paid unless examined and certified to by the Business Committee, or a majority thereof, whose duty it shall be to keep an accurate book of account, in which shall be entered each claim allowed, with date, amount, what for, and in whose favor drawn, which book of account shall be the property of the Society, and shall be referred to Finance Committee in all settlements with Business Committee.

On motion, which was adopted, 2 o'clock P. M. was assigned to hear statements in regard to location of the fair.

Mr. Hyde presented a report upon discretionary premiums in Division B, which report was read and adopted.

Adjourned to two o'clock.

Wednesday Afternoon, December 22, 1875.

Called to order at two o'clock.

Roll called: quorum present.

The special order being to hear from the committee from Kalamazoo, in regard to location of fair for 1876, the following letter from citizens of Kalamazoo, was received and read:

To the President and Officers of the Michigan State Agricultural Society:

GENTLEMEN:—The citizens of Kalamazoo, through a committee duly appointed, hereby extend an invitation to you to hold your next annual fair at Kalamazoo, firmly believing that our location can offer as good if not better facilities than any other town in the State. A cordial invitation is also extended to the Locating Committee to visit with the citizens of Kalamazoo before arrangements are perfected for holding your next fair.

All of which is respectfully submitted.

W. H. COBB,
L. B. KENDALL,
GEO. F. KEDDER.
Committee.

By invitation, Mr. Cobb, of Kalamazoo, addressed the committee.

Mr. Greene moved, and the motion was adopted, that any parties in Detroit or from without, be invited to present applications for the State Fair.

Mr. Baxter offered the following resolution, which was adopted:

Resolved, That the committee on Rules and Regulations be directed to prepare rules prescribing order of business and special rules for the government of this Executive Committee at its business meetings, and present the same for action.

Moved by Mr. Greene, and adopted, that the President appoint a committee of three (3) on location.

Mr. Childs, to whom was referred the discretionary awards in Division K, reported the list of awards, which report was adopted.

Mr. Burrington, for himself and Mr. Manning, to whom were referred discretionary awards in Divisions D, L, and F, reported a list of awards to be paid, which report was adopted.

Mr. Greene, to whom was referred list of discretionary awards in Division G, reported a list of awards, which report was received and adopted.

Col. Shoemaker, from the special committee on Pomology, reported as follows, which, on motion, was adopted:

The committee appointed to confer with the committee of the State Pomological Society would report that at a meeting of the two committees there was a full and fair interchange of opinions, resulting in the conclusion that it was desirable, and that both committees would recommend that the exhibition be combined at the State Fair for 1876,—as they have been for the last three years,—and that the State Agricultural Society extend to the Pomological Society such aid pecuniarily as will enable the latter to make an exhibition as creditable as those of '73, '74, and '75.

In conferring as to the amount to be paid by the State Agricultural Society, it was claimed by the committee of the Pomological Society that it was necessary that it should have \$1,500, the same amount as last year, for general purposes and expenses, and \$1,000 to offer for premiums.

In view of the uncertainty as to where the next State Fair will be held, and to amount of aid the Society would receive from the locality where it should be decided to hold the fair, and also of the reduced amount of the funds now in the treasury of the State Agricultural Society, your committee do not feel that they would be justified in recommending the appropriation of any specific amount, but leave that to be decided by the Executive Committee after they have arrived at some conclusion relative to the holding of the State Fair.

Your committee would, however, recommend that the same reduction be made from the amount appropriated for premiums of the Pomological Society as may be made in the premium list of the Agricultural Society, and that they may in that respect stand upon an equal footing with the Agricultural Society.

In conclusion we wish to express in the most unqualified manner our opinion of the great usefulness of the State Pomological Society, and of the good work they are doing throughout the State. We are decided in the belief that it cannot be over-estimated, and that it deserve and should receive not only all the aid from this Society which it can give, but that the attention of all fruit growers and agriculturists in the State should in every manner possible be called to the great advantages offered by their meetings held at different parts of the State, and they urged to avail themselves of the benefit by their attendance thereon. All of which is respectfully submitted.

M. SHOEMAKER,
A. J. DEAN,
Committee.

Col. Ferry offered the following resolution, and moved its adoption :

Resolved, That — dollars be appropriated from the funds of this Society to facilitate the collection and exhibition of State product at the Centennial Exhibition in 1876—and that said sum be placed in the hands of a committee of six, three to be chosen from the Executive Committee of this Society, and three from Executive Committee of the State Pomological Society—provided that no person engaged or appointed for this service of these societies shall receive compensation for time: and that a detail report of expenses be reported by said Committee to the Executive Committee at the next meeting of the Society.

Col. Ferry moved to fill the blank with \$3,000.

Mr. Childs moved an amendment, filling the blank with \$2,000.

Mr. Dean moved an amendment, filling the blank with \$1,000.

It was moved by Mr. Sterling that the resolution and whole subject be referred to a committee of five. Adopted.

Mr. Ramsdell offered the following resolution :

Resolved, That one thousand dollars be placed in the hands of the President of the Society to be used in such manner as he shall deem best to represent the Agricultural and Pomological interests of this State at the Centennial Exhibition;

As a substitute for that of Col. Ferry's, and moved its reference to the committee provided for by the resolution of Mr. Sterling. So referred.

The committee under Mr. Sterling's resolution comprises the following gentlemen:—Messrs. Sterling, Phillips, Childs, Webster, and Ramsdell.

Thursday Morning, December 23, 1875.

Roll called at 9 A. M. by the President. Quorum present.

Minutes of Wednesday's proceedings read and approved.

The committee on rules of order asked leave to report at a future time. Leave granted.

The Committee on Finance, to whom was referred the reports of the several officers, reported as follows, which was adopted :

MR. PRESIDENT:—The Committee on Finance, to whom was referred the report of the Treasurer, would respectfully report that they have carefully examined the accounts of the said Treasurer, item by item, and find the same correct and as reported by the Treasurer to the Executive Committee.

Detroit, Dec. 22, 1875.

J. WEBSTER CHILDS,
E. W. RISING,
E. VAN VALKENBURGH,
Committee on Finance.

MR. PRESIDENT:—The Committee on Finance, to whom was referred the report of the Business Committee would respectfully report that they have carefully examined the same in detail, and find it correct, and in total footings agreeing with the Secretary's account.

Detroit, Dec. 23, 1875.

J. WEBSTER CHILDS,
E. W. RISING,
E. VAN VALKENBURGH,
Committee on Finance.

The Committee on Finance, to whom was referred the report of the Secretary would respectfully report that they have carefully examined the same, compared the stubs of business orders with the vouchers, and the vouchers with the registers of the business orders issued, and find the same correct.

We have also compared the stubs of premium checks issued, with the register of premiums paid, and find them also correct.

We have examined and find the financial sheet of the Society as follows, as reported by the Secretary, viz.:

Cash on hand at commencement of year.....	\$15,628 80
Received from all sources during the year.....	17,674 22
Total.....	\$33,303 02
Business orders issued during the year.....	\$13,788 16
Appropriation to Pomological Society, drawn by said Society directly from the treasury.....	1,500 00
Premium checks issued.....	12,676 50
	<hr/>
	\$27,964 66

Balance in treasury Dec. 21st, 1875, subject to draft by the Society, \$5,338.36.

J. WEBSTER CHILDS,
E. W. RISING,
E. VAN VALKENBURGH,
Committee.

Mr. Sterling, from the Committee on Centennial, to whom was referred certain resolutions, reported as follows, which report was adopted:

Your committee, to whom was referred the matter of appropriation for Centennial Exhibition, beg leave to report the following resolution:

Resolved, That one thousand dollars (\$1,000) be placed at the disposal of the President of the Michigan State Agricultural Society, to be used in such manner as he shall deem best to represent the agricultural and horticultural interests of the State at the Centennial Exhibition.

J. M. STERLING,
WM. L. WEBBER,
J. G. RAMSDELL,
J. WEBSTER CHILDS,
G. W. PHILLIPS,
Committee.

Mr. Webber offered a resolution in relation to making appropriations for the Pomological Society, which, on motion, was referred to a committee of three. The President appointed Messrs. Webber, Dean, and Baxter such committee.

The President submitted a dispatch from Mr. Avery, from Grand Rapids, which is as follows, was read and referred to the Locating Committee.

To E. O. Humphrey, President State Society:

Our grounds have been tendered to the State Agricultural Society for 1876, free of charge.

(Signed.)

N. L. AVERY.

Mr. Hanford offered the following resolution which, on motion, was adopted:

Resolved, That the superintendents of the several departments be authorized to correspond with and appoint viewing committees in the several classes of their departments; and also that said superintendents be authorized to furnish said committees with complimentary admission tickets.

Mr. Childs made the following report on Treasurer's bond, which, on motion, was adopted :

MR. PRESIDENT,—The committee on Finance, to whom was referred the bond of the Treasurer, would respectfully report that they have examined the said bond and find it properly drawn, and in the penal sum of \$30,000, and with securities which your committee consider amply sufficient.

J. WEBSTER CHILDS,
E. W. RISING,
E. VAN VALKENBURG.
Committee on Finance.

Detroit, Dec. 23, 1875.

Whereupon the committee adjourned for one hour.

The Secretary laid before the committee a letter from ex-President Wells, making a request on behalf Mr. Watts' Committee of Agriculture for a brief historical sketch of this society, and suggested Mr. Holmes, the first Secretary of this Society, as the proper person to prepare the same. Mr. Holmes was so appointed.

Mr. Sterling moved that the next State Fair be held during the third week in September, continuing five days. Adopted.

Mr. Webber, from the committee on pomological appropriation, reported as follows, which report, on motion, was received and adopted by a vote of 21 yeas and 2 nays :

The committee on appropriation for the Pomological Society, in view of a Union Fair for 1876, report the following as a substitute for the resolution referred to them, and recommend its adoption :

Resolved, That in case the Pomological Society of Michigan unite with this Society in a Union Fair for 1876, as was done in 1875, there shall be paid from the funds of this Society the sum of \$1,000.00 for premiums in the Pomological Department, or so much thereof as shall be awarded, and the further sum of \$1,500.00 for the general expenses of the Pomological Society for 1876, subject to the following provisions :

1. The cash premiums offered by the Pomological Society shall not exceed the given sum of \$1,000.

2. Of the sum for general expenses, at least \$500 shall be paid in preparing for, and actual expenses of said Pomological Society during the week of the Union Fair.

3. All the receipts of such Union Fair shall be paid into the treasury of this Society.

4. All sums drawn under this resolution shall be only on vouchers approved and endorsed by the Finance Committee of the Pomological Society, and shall not be drawn until needed for actual disbursement.

5. The officers, members, and committee of the Pomological Society shall have the same rights and courtesies extended to them for the fair of 1876 as was extended for the fair of 1875.

6. The manner of drawing the money for cash premiums under this resolution shall be the same as in 1875, and all orders for other moneys shall pass through the hands and be approved by the Business Committee of this Society.

7. The premium list of said Pomological Department shall be printed with, and as a part of, the premium list of this Society.

8. The proper committee of the Pomological Society shall signify in writing their acceptance or rejection of this resolution within ten days from this date.

9. Members of this Society shall have a right to exhibit and compete for premiums in the Pomological Department without payment of any fee for membership in the Pomological Department.

Respectfully submitted.

W. L. WEBBER,
W. J. BAXTER,
A. J. DEAN,
Committee.

Adopted.

Mr. Childs presented the following resolution, and its adoption moved :

Resolved, That in connection with the next annual fair of this Society arrangements be made for a Historical and Centennial Department.

On motion of Mr. Childs the resolution was referred to a committee of three to report. Committee consist of Messrs. Childs, Ferry, and Baxter.

The following communication from the Pomological committee accepting the propositions of this Society for a Union Fair was read, accepted, and ordered placed upon the records:

DETROIT, December 23, 1875.

Hon. E. O. Humphrey, President of the Michigan State Agricultural Society:

DEAR SIR:—The committee of the Michigan State Pomological Society having had under consideration the proposition adopted by your Society in reference to the union exhibition of the two societies for the year 1876, have found the provisions therein contained satisfactory, and on behalf of the State Pomological Society signify their acceptance of the same.

A. J. COOK, *Committee.*

Thursday Afternoon, December 23, 1875.

Called to order at 2 o'clock P. M. Roll called: quorum present.

The first in order being the report of Premium List Committee, Mr. Greene, as chairman, submitted the report, which was read and adopted as follows:

LIST OF PREMIUMS, 1876.

DIVISION A.—CATTLE.

A—CLASS 1.—SHORTHORNS.

	1st Prem.	2d Prem.	3d Prem
Bull, four years old or over.....	\$30 00	\$20 00	\$10 00
Bull, three years old.....	20 00	12 00	8 00
Bull, two years old.....	15 00	10 00	5 00
Bull, one year old.....	10 00	5 00	3 00
Bull calf.....	7 00	5 00	3 00
Best bull of any age.....		Diploma	
Cow, four years old or over.....	30 00	20 00	10 00
Heifer, three years old.....	20 00	12 00	8 00
Heifer, two years old.....	15 00	10 00	5 00
Yearling heifer.....	10 00	5 00	3 00
Heifer calf.....	7 00	5 00	3 00

NOTE TO EXHIBITORS.—The exhibitor shall be required to exhibit a pedigree of the animal competing, and the winner of the premiums must file with the Secretary a copy of the pedigree of the animal which was the successful competitor. Where all other points are equal, the committee is to be guided by the condition of the animal for breeding purposes. The pedigree must show descent on both sides from imported stock. Directness of descent and an acknowledged celebrity of ancestry to rule in the comparison of pedigree. Quality of animal and fitness for breeding, with justness of proportion, to be considered next after establishing purity of blood. This rule applies to all the improved breeds of cattle.

The entry of young stock in the appropriate section does not preclude them being shown with their sire or dam.

A—CLASS 2.—DEVONS.

	1st Prem.	2d Prem.	3d Prem.
Bull, four years old or over.....	\$30 00	\$20 00	\$10 00
Bull, three years old.....	20 00	12 00	8 00
Bull, two years old.....	15 00	10 00	5 00
Bull, one year old.....	10 00	5 00	3 00
Bull calf.....	7 00	5 00	3 00
Best bull of any age.....			Diploma
Cow, four years old or over.....	30 00	20 00	10 00
Heifer, three years old.....	20 00	12 00	8 00
Heifer, two years old.....	15 00	10 00	5 00
Yearling heifer.....	10 00	5 00	3 00
Heifer calf.....	7 00	5 00	3 00

A—CLASS 3.—HEREFORDS.

	1st Prem.	2d Prem.
Bull, four years old or over.....	\$30 00	\$20 00
Bull, three years old or over.....	20 00	12 00
Bull, two years old.....	15 00	10 00
Bull, one year old.....	10 00	5 00
Bull calf.....	7 00	5 00
Best bull of any age.....		Diploma
Cow, four years old or over.....	30 00	20 00
Heifer, three years old.....	20 00	12 00
Heifer, two years old.....	15 00	10 00
Heifer, one year old.....	10 00	5 00
Heifer calf.....	7 00	5 00

A—CLASS 4.—AYRSHIRES.

	\$30 00	\$20 00
Bull, four years old.....	20 00	10 00
Bull, three years old.....	10 00	5 00
Bull, two years old.....	8 00	4 00
Bull, one year old.....	4 00	2 00
Bull calf.....		Diploma
Best bull of any age.....	30 00	20 00
Cow, four years old.....	20 00	10 00
Cow, three years old.....	10 00	5 00
Heifer, two years old.....	8 00	4 00
Heifer, one year old.....	4 00	2 00
Heifer calf.....		

A—CLASS 5.—ALDERNEYS.

	\$30 00	\$20 00
Bull, four years old.....	20 00	10 00
Bull, three years old.....	10 00	5 00
Bull, two years old.....	8 00	4 00
Bull, one year old.....	4 00	2 00
Bull calf.....		Diploma
Best bull of any age.....	30 00	20 00
Cow, four years old.....	20 00	10 00
Cow, three years old.....	10 00	5 00
Heifer, two years old.....	8 00	4 00
Heifer, one year old.....	4 00	2 00
Heifer calf.....		

A—CLASS 6.—GALLOWAYS.

	\$30 00	\$20 00
Bull, four years old.....	20 00	10 00
Bull, three years old.....	10 00	5 00
Bull, two years old.....	8 00	4 00
Bull, one year old.....	4 00	2 00
Bull calf.....		Diploma
Best bull of any age.....	30 00	20 00
Cow, four years old.....	20 00	10 00
Cow, three years old.....	10 00	7 00
Heifer, two years old.....	8 00	4 00
Heifer calf, one year old.....	4 00	2 00
Calf.....		

A—CLASS 7.—GRADE AND NATIVE CATTLE.

	1st Prem.	2d Prem.	3d Prem.
Grade or native cow, four years or over.....	\$20 00	\$10 00	\$5 00
Heifer, three years old.....	15 00	7 00	4 00
Heifer, two years old.....	10 00	5 00	-----
Yearling heifer.....	8 00	5 00	-----
Heifer calf.....	5 00	3 00	-----
Best bull of any age.....			Diploma

All native cows rank as grades.

A—CLASS 8.—WORKING OXEN AND STEERS.

Yoke of working oxen, five years old and over.....	\$25 00	\$20 00	\$15 00
Yoke of steers, four years old.....	15 00	10 00	7 00
Yoke of steers, three years old.....	10 00	7 00	5 00
Yoke of steers, two years old.....	8 00	5 00	3 00
Yoke of steers, one year old.....	5 00	3 00	-----
To the trainer of best exhibition of trained stock.....	5 00	-----	-----

The working oxen, five years old and over, will be tested to draft in such manner as the committee may direct, for the purpose of proving their quality as working stock.

The trained cattle are to show as competent for actual service on the road or field. Mere "fancy" training in the yard is not what the Society desires to promote.

A—CLASS 9.—FAT CATTLE.

Awarding committee to be appointed on the grounds.

	1st Prem.	2d Prem.
Herd of fat cattle, four in number.....	\$75 00	\$50 00
Pair of fat oxen.....	30 00	20 00
Fat ox.....	15 00	10 00
Fat cow.....	15 00	10 00
Steer, three years old.....	10 00	5 00
Heifer, three years old.....	10 00	5 00
Steer, two years old.....	6 00	-----
Heifer, two years old.....	6 00	-----

A—CLASS 10.—HERDS AND SWEEPSTAKES.

Awarding committee to be appointed on the grounds. Herd No. 1—Premiums \$250.00.

For herds of thoroughbred cattle composed of one bull over one year old, and not less than four cows or heifers, the exhibitor must have owned the whole herd at least three months previous to the fair. In judging the different ages, from five year old and over cows to calves, the best for age shall have the preference over aged cows or numbers. No entry fee.

First premium.....	\$75 00
Second premium.....	50 00
Third premium.....	25 00

DIVISION B.—HORSES.

B—CLASS 11.—THOROUGHBREDS.

	1st Prem.	2d Prem.	3d Prem.
Stallion, four years old or over.....	\$30 00	\$20 00	\$10 00
Stallion, three years old.....	20 00	15 00	10 00
Stallion, two years old.....	12 00	8 00	5 00
Stallion, one year old.....	10 00	6 00	4 00
Stallion colts.....	7 00	5 00	3 00
Brood mare, four years old or over, with foal by her side.....	20 00	15 00	10 00
Mare, four years old or over, without colt.....	15 00	12 00	8 00
Three year old filly.....	12 00	8 00	5 00
Two year old filly.....	10 00	6 00	4 00

	1st Prem.	2d Prem.	3d Prem.
Yearling filly.....	\$7 00	\$5 00	\$3 00
Filly colt.....	6 00	4 00	3 00
Gelding, four years old.....	12 00	8 00	-----
Gelding, three years old.....	10 00	5 00	-----
Gelding, two years old.....	8 00	5 00	-----

The competitors who enter thoroughbred horses will note:

First. That the judges will be required to reject any animal whose pedigree is not authenticated, and which cannot be traced back without flaw on either side of sire or dam, to well known English or American thoroughbred stock.

Second. Soundness, symmetry, and size, as well as the utility of the recorded animal for improving the stock of horses in this State, should be considered. The pedigree settles the question as to blood and breeding.

If the stallion can be accompanied by any number of his colts, of any age, to show his quality as a stock horse, so much the better.

B—CLASS 12.—HORSES OF ALL WORK.

	1st Prem.	2d Prem.	3d Prem.
Stallion, five years old or over.....	\$30 00	\$20 00	\$10 00
Stallion, four years old.....	25 00	15 00	10 00
Stallion, three years old.....	20 00	15 00	10 00
Stallion, two years old.....	12 00	8 00	5 00
Stallion, one year old.....	10 00	6 00	4 00
Stallion colt.....	7 00	5 00	3 00
Brood mare, four years old or over, with foal by her side....	20 00	15 00	10 00
Mare, four years old or over, without colt.....	12 00	8 00	5 00
Mare, three years old.....	12 00	8 00	5 00
Filly, two years old.....	10 00	6 00	4 00
Filly, one year old.....	7 00	5 00	3 00
Filly, colt.....	6 00	4 00	2 00
Gelding, four years old.....	12 00	8 00	5 00
Pair of matched horses of all work, five years old or over, speed, size, style, and fitness for carriage or farm work to be the points; weight of each horse to be not less than 1,100 pounds.....	30 00	20 00	10 00
Pair of four year old horses, matched in color, speed, size, style, and fitness for carriage or farm work.....	25 00	15 00	10 00
Pair of matched horses, for all work, three years old.....	15 00	10 00	5 00

RULE.—All entries in this class, where weight is one of the conditions, shall be accompanied with a reliable certificate of date not exceeding one week previous to the opening of the exhibition, showing, satisfactorily, the weight of the animals that are entered for competition.

The "horse of all work" (breeding stock) should not be less than 15½ hands in height, nor less than 1,100 pounds in weight, quick, lively ears, broad between the eyes, a round barrel, short loins, well up in the shoulders, deep chested, square quarters, flat legs, short between knee and pastern, hind legs well under him, speed equal to eight miles an hour on the road, and at least three miles at the plow, with sufficient blood to ensure spirit, style and endurance. As in this class it is evident the mature animals are intended for breeding, they should be sound; and as the young animals must be judged on their own merits, as well as their promise for future usefulness, they also must be sound or else they cannot compete. The "horse of all work" is intended to be capable of being trained for the saddle, for harness, and to be able to go on the road or in draught, as he may chance to be broken. It may be that the "horse of all work" shall, after a few years' training, make a useful, spirited, handsome family roadster, or he may be brought up to be a good draught horse, true to pull to any load that may be put behind him. Much depends upon the use he is put to. Hence, the judges will note that he is not to be judged by the speed he may make for a single mile. Hence, also, it will be noted that he may be thoroughbred or he may not, and for the same reason he must have size, action, and spirit, as well as constitution, if he is worthy of a premium as a breeding animal.

The Executive Committee have decided that a mare may show as many colts as her owner desires, to prove her quality as a dam, but one of these colts must be the produce of the year of the exhibition.

B-CLASS 13.—ROADSTERS—BREEDERS' STOCK.

	1st Prem.	2d Prem.	3d Prem.
Stallion, five years old or over.....	\$30 00	\$20 00	\$10 00
Stallion, four years old.....	25 00	15 00	10 00
Gelding, five years old.....	15 00	10 00	5 00
Stallion, three years old.....	20 00	15 00	10 00
Stallion, two years old.....	12 00	8 00	5 00
Yearling stallion.....	10 00	6 00	4 00
Colt.....	7 00	5 00	3 00
Brood mare, four years old or over, with foal by her side....	20 00	15 00	10 00
Mare four years old or over, without colt.....	12 00	8 00	5 00
Mare, three years old.....	10 00	6 00	4 00
Mare, two years old.....	8 00	5 00	3 00
Mare, one year old.....	8 00	5 00	2 00
Colt.....	6 00	4 00	2 00

RULE.—All exhibitors in Class 12 shall bring with the entry a copy of certificate of breeding, which shall be filed with the Secretary, and which shall be put on record in all cases where premiums are awarded. No horse will be ruled out for want of certificate, where breeding cannot be established; but a well authenticated pedigree will be considered a favorable point, all others being equal.

B-CLASS 14.—GENT'S DRIVING HORSE TO ROAD WAGON.

	1st Prem.	2d Prem.	3d Prem.	4th Prem.
Best pair of driving horses, owned and driven by the exhibitor for thirty days previous to the Fair, not used for sporting purposes, to be exhibited under the direction of the Superintendent in charge of department.....	\$50 00	\$30 00	\$20 00	\$10 00
Single gelding or mare, five years old or over.....	30 00	20 00	10 00	5 00
Four year old single mare or gelding.....	20 00	15 00	10 00	5 00

The committee will test all animals entered in this class, under such rules as may be deemed necessary to determine the merits of the competitors, it being understood that speed is not to be the sole test.

RULE.—All horses shown in this class shall be driven by the owners, and must have been owned and driven by them for thirty days previous to the entry for exhibition, and not used for sporting purposes.

NOTE.—The viewing committee are to understand that it is the design of the Society to make it clear that only gentlemen's roadsters can be permitted to compete, and that any two horses that may be harnessed together for the occasion are not a driving team in the meaning of the premium list.

B-CLASS 15.—DRAUGHT HORSES.

	1st Prem.	2d Prem.	3d Prem.
Stallion, four years old or over.....	\$30 00	\$20 00	\$10 00
Stallion, three years old.....	25 00	15 00	10 00
Stallion, two years old.....	20 00	12 00	8 00
Colt, one year old.....	10 00	6 00	4 00
Sucking colt.....	7 00	5 00	3 00
Imported draught stallion, of any breed, or those bred from imported sire and dam, four years old and over, weight 1,600 pounds or over.....	50 00	30 00	20 00
Draught mare, four years old or over.....	30 00	20 00	10 00
Mare, three years old.....	12 00	8 00	5 00
Mare, two years old.....	10 00	6 00	4 00
Mare, one year old.....	7 00	5 00	3 00
Colt.....	6 00	4 00	2 00

NOTE.—Horses exhibited in the above class must weigh not less than 1,300 pounds, if four years old or over.

SWEEPSTAKES PREMIUMS—DRAUGHT HORSES.

	1st Prem.	2d Prem.	3d Prem.
Best span of draught horses.....	\$30 00	\$20 00	\$10 00

B—CLASS 16.—CARRIAGE AND BUGGY HORSES.

	1st Prem.	2d Prem.	3d Prem.
Pair of matched carriage horses, sixteen hands or over, and five years old or over.....	\$30 00	\$20 00	\$10 00
Pair of matched carriage horses, sixteen hands or over, and four years old.....	25 00	15 00	10 00
Pair of matched carriage horses, under sixteen hands, and four years old or over.....	30 00	20 00	10 00
Pair of matched carriage horses, three years old.....	20 00	12 00	8 00
Single carriage or buggy horse or mare, four years old or over.....	12 00	8 00	4 00
Single carriage or buggy horse or mare, three years old.....	10 00	7 00	3 00

RULE.—All horses in this class shall be measured by a standard on the ground, and by the committee, and speed shall not be considered the sole test of merit. The several points of form, general beauty, style, action, matching and evenness of gait, are to be considered.

B—CLASS 17.—SADDLE HORSES.

	1st Prem.	2d Prem.	3d Prem.
Saddle horse.....	\$15 00	\$10 00	\$5 00

B—CLASS 18.—BREEDERS' SPECIAL PREMIUMS FOR MICHIGAN HORSES—ROADSTERS AND THOROUGHBREDS.

For Roadster Stallions Owned and that have Made the Present Season within the State.

	1st Prem.	2d Prem.	3d Prem.
Five years old or over.....	\$125 00	\$100 00	\$75 00
Four years old.....	100 00	75 00	50 00
Three years old.....	75 00	50 00	25 00

For Mares and Geldings.

	1st Prem.	2d Prem.	3d Prem.
Five years or over.....	\$125 00	\$100 00	\$75 00
Four years old.....	100 00	75 00	50 00
Three years old.....	75 00	50 00	25 00

RULE.—The above animals shall be judged not only by speed, but by all the qualities that constitute value in the horse for road, carriage, or market purposes, to be shown in harness and under the direction of the Superintendent in charge of the department, as he may direct.

Thoroughbred Stallions, Mares and Geldings.

For thoroughbred or partly thoroughbred stallions owned in and that have made the present season in the State, to be shown under the saddle, and to be judged by speed and all the valuable qualities for saddle, carriage or cavalry purposes:

	1st Prem.	2d Prem.	3d Prem.
Stallions, any age.....	\$100 00	\$75 00	\$50 00
Mares or geldings, any age over three years.....	100 00	75 00	50 00
Three year old colts or fillies.....	100 00	75 00	50 00

B—CLASS 19.—MULES AND JACKS.

	1st Prem.	2d Prem.
Spanish or Maltese jack, which has been kept in the State for service not less than three months previous to the exhibition, and has proved to be a good stock getter.....	\$20 00	\$10 00
Young jack, not less than one year nor more than three years old, bred in Michigan.....	10 00	-----
Jenny, with foal at her side.....	8 00	6 00
Pair of aged mules.....	10 00	5 00
Best show of young mules, taking number and quality into consideration, bred from one jack, not less than five in number, of any age....	20 00	-----

DIVISION C.—SHEEP AND SWINE.

All ewes, three years old or over, exhibited in Classes Nos. 18, 19, 20, and 21 are required to have bred a lamb during the present year, and all sheep shall be entered and compete in one class only. Pens shall consist of three in number, unless otherwise specified.

C—CLASS 19.—AMERICAN MERINOS.

	1st Prem.	2d Prem.	3d Prem.
Buck, two years old or over.....	\$15 00	\$10 00	\$5 00
Buck, one year old.....	12 00	8 00	4 00
Three buck lambs.....	10 00	5 00	3 00
Three ewes, two years old or over.....	15 00	10 00	5 00
Three ewes, one year old.....	12 00	8 00	4 00
Three ewe lambs.....	10 00	5 00	3 00

C—CLASS 20.—SOUTHDOWN AND OTHER MIDDLE WOOLED SHEEP.

NOTE.—All middle wooled sheep shall compose and compete in this class.

	1st Prem.	2d Prem.	3d Prem.
Buck, two years old or over.....	\$15 00	\$10 00	\$5 00
Yearling buck.....	12 00	8 00	4 00
Pen of buck lambs.....	10 00	5 00	3 00
Three ewes, two years old or over.....	15 00	10 00	5 00
Three ewes, one year old.....	12 00	8 00	4 00
Three ewe lambs.....	10 00	5 00	3 00

C—CLASS 21.—COTSWOLD, LEICESTER, AND OTHER LONG WOOLED SHEEP.

NOTE.—All long wooled sheep compete in this class.

	1st Prem.	2d Prem.	3d Prem.
Buck, two years old or over.....	\$15 00	\$10 00	\$5 00
Yearling buck.....	12 00	8 00	4 00
Pen of three buck lambs.....	10 00	5 00	3 00
Three ewes, two years old.....	15 00	10 00	5 00
Three ewes, one year old.....	12 00	8 00	4 00
Three ewe lambs.....	10 00	5 00	3 00

C—CLASS 22.—FAT SHEEP.

Pen middle wooled sheep.....	\$8 00	\$5 00	\$3 00
Pen long wooled sheep.....	8 00	5 00	3 00

C—CLASS 23.—SWINE.

Berkshire.

Boar, two years old or over.....	\$12 00	\$8 00	\$4 00
Boar, one year old.....	10 00	6 00	3 00
Sow, two years old.....	12 00	8 00	4 00
Sow, one year old.....	10 00	6 00	3 00
Best pen of pigs, not less than four in number, nor over ten months old.....	10 00	6 00	3 00

Essex.

Boar, two years old or over.....	12 00	8 00	4 00
Boar, one year old.....	10 00	6 00	3 00
Sow, two years old or over.....	12 00	8 00	4 00
Sow, one year old.....	10 00	6 00	3 00
Best pen of pigs, not less than four in number, nor over ten months old.....	10 00	6 00	3 00

Suffolk.

Boar, two years old or over.....	12 00	8 00	4 00
Boar, one year old.....	10 00	6 00	3 00
Sow, two years old or over.....	12 00	8 00	4 00
Sow, one year old.....	10 00	6 00	3 00
Best pen of pigs, not less than four in number, nor over ten months old.....	10 00	6 00	3 00

Fat Hogs.

Best hog, over one year old.....	10 00	6 00	3 00
Best pig, less than ten months old.....	6 00	4 00	2 00

C—CLASS 23.—SWINE.

Poland China or other Large Breeds.

	1st Prem.	2d Prem.	3d Prem.
Boar, two years old or over.....	\$12 00	\$8 00	\$4 00
Boar, one year old.....	10 00	6 00	3 00
Sow, two years old or over.....	12 00	8 00	4 00
Sow, one year old.....	10 00	6 00	3 00
Best pen of pigs, not less than four in number, nor over ten months old.....	10 00	6 00	3 00

The Committee will note that there are some breeds, such as the Lancashire White, the Lincoln, the Yorkshire and the Neapolitan, not mentioned by name, which are deserving of notice. Should any of these be offered for premiums, the exhibitor must be able to prove purity of blood and directness of descent, to the satisfaction of the committee, who may award discretionary premiums.

In case an award is made to a single individual of a litter, and the litter is entered for a premium, there must be four in number, without the one entered for a special premium, but the pig may not be ruled out of the litter otherwise, as the sow, as a breeder, is entitled to show the whole of her progeny, no matter what the number.

DIVISION D—POULTRY.

CLASS 24—POULTRY.

	1st Prem.	2d Prem.
For the best, most varied, and most valuable collection of Poultry, entered and owned by one exhibitor.....	\$15 00	\$10 00

*The Asiatic Class.**Fowls.**Chickens.*

	1st Prem.	2d Prem.	1st Prem.	2d Prem.
Trio light Brahmas.....	\$2 00	\$1 00	\$2 00	\$1 00
Trio dark Brahmas.....	2 00	1 00	2 00	1 00
Trio buff Cochins.....	2 00	1 00	2 00	1 00
Trio partridge or grouse Cochins.....	2 00	1 00	2 00	1 00
Trio white Cochins.....	2 00	1 00	2 00	1 00

The Dorking Class.

Trio colored Dorkings, except silver gray.....	2 00	1 00	2 00	1 00
Trio white Dorkings.....	2 00	1 00	2 00	1 00
Trio dominiques.....	2 00		2 00	

The Game Class.

Pair black-breasted red games.....	2 00	1 00	2 00	1 00
Pair duck-wing games.....	2 00	1 00	2 00	1 00
Pair blue games.....	2 00	1 00	2 00	1 00
Pair white-legged early Derby games.....	2 00	1 00	2 00	1 00

The Spanish Class.

Trio black Spanish.....	2 00	1 00	2 00	1 00
Trio white Leghorns (yellow legs, single combs,).....	2 00	1 00	2 00	1 00

The Polish Class.

Trio black Polish.....	2 00	1 00	2 00	1 00
Trio white Polish (white crests).....	2 00	1 00	2 00	1 00
Trio silver Polish.....	2 00	1 00	2 00	1 00
Trio golden Polish.....	2 00		2 00	

The French Class.

Trio Crevecoeurs.....	2 00	1 00	2 00	1 00
Trio Houdans.....	2 00	1 00	2 00	1 00
Trio La Fleche.....	2 00		2 00	

The Hamburg Class.

Trio golden spangled Hamburg.....	2 00	1 00	2 00	1 00
Trio silver spangled Hamburg.....	2 00	1 00	2 00	1 00

Miscellaneous Class.

Trio silkies.....	2 00	1 00	2 00	1 00
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The Bantam Class.

	1st Prem.	2d Prem.	1st Prem.	2d Prem.
Trio black-breasted red game bantams.....	\$2 00	\$1 00	\$2 00	\$1 00
Trio duck-wing game bantams.....	2 00	1 00	2 00	1 00
Trio silver-laced Sebright bantams.....	2 00	1 00	2 00	1 00
Trio gold-laced Sebright bantams.....	2 00	1 00	2 00	1 00
Trio black African bantams.....	2 00	1 00	2 00	1 00

The Turkey Class.

	1st Prem.	2d Prem.
Pair bronzed turkeys.....	\$2 00	\$1 00
Pair white turkeys.....	2 00	1 00
Pair buff turkeys.....	2 00	1 00
Pair gray turkeys.....	2 00	1 00
Pair slate turkeys.....	2 00	1 00
Pair black turkeys.....	2 00	1 00
Pair pearl Guinea fowls.....	2 00	1 00
Pair white Guinea fowls.....	2 00	1 00

The Ornamental Class.

Pair peafowls.....	2 00	---
Pair white peafowls.....	2 00	---
Pair English pheasants.....	2 00	---

The Goose Class.

Pair Toulouse geese.....	3 00	1 00
Pair Bremen geese.....	2 00	1 00

The Duck Class.

Pair Rouen ducks.....	2 00	1 00
Pair Aylesbury ducks.....	2 00	1 00
Pair Cayuga ducks.....	2 00	1 00
Pair topknot ducks.....	2 00	1 00
Pair musk or Muscovy ducks.....	2 00	1 00

The Rabbit Class.

Lop-eared rabbits, buck of any color.....	2 00	1 00
Lop-eared rabbits, doe of any color.....	2 00	1 00

The Pigeon Class.

For the best, most varied, and most valuable collection of Pigeons, entered and owned by one exhibitor.....	\$5 00	
Pouters, best pair yellow-pied.....	1 00	
Pouters, best pair black-pied.....	1 00	
Pouters, best pair blue-pied.....	1 00	
Pouters, best pair red-pied.....	1 00	
Pouters, best pair white.....	1 00	
Pouters, best pair of any color.....	1 00	
Carriers, best pair black.....	2 00	
Carriers, best pair white.....	2 00	
Carriers, best pair blue.....	2 00	
Carriers, best pair dun.....	2 00	
Carriers, best pair yellow.....	2 00	

(Short-Faced Tumblers.)

Almond tumblers, best pair.....	1 00
Almond tumblers, best pair beards.....	1 00
Almond tumblers, best pair bald-heads.....	1 00
Almond tumblers, best pair mottles.....	1 00
Almond tumblers, best pair agates.....	1 00
Almond tumblers, best pair kites.....	1 00
Almond tumblers, best pair of any other color or marking.....	1 00
Fantails, best pair white.....	1 00
Fantails, best pair blue.....	1 00
Fantails, best pair red.....	1 00
Fantails, best pair yellow.....	1 00
Fantails, best pair Black.....	1 00
Jacobins, best pair.....	1 00

Runts, best pair.....	\$1 00
Turbits, best pair.....	1 00
Swallows, best pair.....	1 00
Trumpeters, best pair.....	1 00
Spots, best pair.....	1 00
Nuns, best pair.....	1 00
Priests, best pair.....	1 00
Helmets, best pair.....	1 00
Laughers, best pair.....	1 00
Archangels, best pair.....	1 00
Starlings, best pair.....	1 00
Magpies, best pair.....	1 00
Owls, best pair black.....	1 00
Owls, best pair white.....	1 00
Owls, best pair blue.....	1 00
Owls, best pair red.....	1 00
Owls, best pair yellow.....	1 00
Dragons, best pair.....	1 00
Antwerps.....	1 00
Barbs, best pair black.....	1 00
Barbs, best pair white.....	1 00
Barbs, best pair red.....	1 00
Barbs, best pair yellow.....	1 00

Cage-Bird Class.

For the best, most varied, and most valuable collection of singing birds, owned and entered by one exhibitor.....	5 00
Canaries, best pair (<i>Belgian song birds</i>).....	2 00
Canaries, best pair (<i>German</i>).....	2 00

The Minor Pet Class.

Best pair Guinea pigs.....	Diploma
Best show of white mice.....	Diploma
Best show of European dormice.....	Diploma
Best specimen of squirrels.....	Diploma
Best pair of ferrets.....	Diploma
Best pair of Minks.....	Diploma

Stuffed Birds.

	1st Prem.	2d. Prem.
Best collection.....	\$10 00	\$5 00
To be placed in Art Hall.		

DIVISION E—FARM AND GARDEN PRODUCE AND MANUFACTURED PRODUCTS.

CLASS 25.—GRAIN AND SEEDS.

	1st Prem.	2d. Prem.
Bushel of winter red wheat, yield not less than 20 bushels to the acre.....	\$6 00	\$4 00
Bushel of winter white wheat, yield not less than 20 bushels to the acre.....	6 00	4 00
Bushel of spring wheat.....	5 00	3 00
Bushel of rye.....	3 00	2 00
Bushel of four-rowed barley.....	5 00	3 00
Bushel of oats.....	5 00	3 00
Bushel of winter barley.....	5 00	3 00
Bushel of dent corn, in the ear.....	5 00	3 00
Bushel of flint corn, in the ear.....	5 00	3 00
Bushel of other variety of corn.....	5 00	3 00
Bushel of peas.....	5 00	3 00
Bushel of white beans.....	5 00	3 00
Bushel of large clover seed.....	5 00	3 00
Bushel of small clover seed.....	5 00	3 00
Bushel of timothy seed.....	5 00	3 00
Bushel of buckwheat.....	4 00	2 00
Bushel of flax seed.....	4 00	----

	1st Prem.	2d Prem.
Bushel of red top grass seed.....	\$5 00	\$3 00
Bushel of blue grass seed.....	5 00	3 00
Sample of hops.....	2 00	1 00
Bushel of seed of any new variety of valuable grass that has been tried as a crop, of not less than two acres, within the State of Michigan, with a description of the manner of treatment, and how the seed was originally procured by the exhibitor.....		\$10 00
Best exhibition of a general assortment of seeds for field crops—greatest variety and quality of seeds to be taken into consideration..... Diploma and		10 00
Best assortment and greatest variety of kitchen garden seeds, properly classified.....		10 00
Best display of a collection of the several kinds of grain in heads, arranged and named.....		5 00
RULE.—All seeds sown in this class are required to be the growth of the present year.		

E—CLASS 26.—ROOTS AND VEGETABLES.

	1st Prem.	2d Prem.	3d Prem.
Best and greatest variety of roots for feeding stock.....	\$12 00	\$10 00	\$5 00
Best and greatest variety of roots and vegetables from any one garden.....	12 00	10 00	5 00
	1st Prem.	2d Prem.	
Three varieties of early potatoes, a peck or more of each kind.....	\$3 00	\$2 00	
Three varieties of late potatoes, a peck or more of each kind.....	3 00	2 00	
Sample of a peck or more of any variety of early potatoes.....	3 00	2 00	
Sample peck or more of any late variety.....	3 00	2 00	
Sample peck or more of sweet potatoes.....	3 00	2 00	
Dozen or more blood beets.....	2 00	1 00	
Dozen or more turnip beets.....	2 00	1 00	
Dozen or more sugar beets.....	2 00	1 00	
Dozen or more white or yellow beets.....	2 00	1 00	
Dozen or more beets for table use.....	2 00	1 00	
Collection of five or more kinds of beets, ten of a kind.....	3 00	2 00	
Dozen or more mangel wurtzel.....	2 00	1 00	
Dozen or more orange carrots.....	2 00	1 00	
Dozen or more white carrots.....	2 00	1 00	
Dozen or more any other variety of carrots.....	2 00	1 00	
Collection of four or more kinds of carrots, at least ten of a kind.....	3 00	2 00	
Dozen or more flat turnips.....	2 00	1 00	
Dozen or more Swedes turnips.....	2 00	1 00	
Dozen or more any other variety of turnips.....	2 00	1 00	
Collection of four or more kinds of turnips, at least ten of a kind.....	3 00	2 00	
Dozen or more parsnips.....	2 00	1 00	
Dozen or more salsify.....	2 00	1 00	
Dozen or more winter radishes.....	2 00	1 00	
Dozen or more summer radishes.....	2 00	1 00	
Collection of three or more kinds of radishes, and at least ten of a kind.....	3 00	2 00	
For greatest variety of culinary vegetables grown by exhibitor.....	5 00	3 00	
Four heads drumhead cabbage.....	2 00	1 00	
Four heads conehead cabbage.....	2 00	1 00	
Four heads Savoy or curled cabbage.....	2 00	1 00	
Four heads red cabbage.....	2 00	1 00	
Collection of five or more kinds of cabbage, four or more heads of each kind.....	3 00	2 00	
Four heads cauliflower.....	2 00	1 00	
Four heads broccoli.....	2 00	1 00	
Six heads lettuce.....	2 00	1 00	
Six bunches kale.....	2 00	1 00	
Dozen stems celery, bleached.....	2 00	1 00	
Dozen stems rhubarb.....	2 00	1 00	
Half dozen vegetable eggs.....	2 00	1 00	
Dozen peppers.....	2 00	1 00	
Three varieties of tomatoes, one dozen each.....	2 00	1 00	
Peck any variety tomatoes.....	2 00	1 00	
Peck white onions.....	2 00	1 00	

	1st Prem.	2d Prem.
Peck red onions.....	\$2 00	\$1 00
Peck yellow onions.....	2 00	1 00
Collection of five or more kinds of onions, not less than one-half peck of a kind.....	3 00	2 00
Five summer squashes.....	2 00	1 00
Five marrow squashes.....	2 00	1 00
Five Hubbard squashes.....	2 00	1 00
Single squash.....	2 00	1 00
Collection of four or more kinds of squashes, at least three of a kind..	3 00	2 00
Two sweet pumpkins.....	2 00	1 00
Two field pumpkins.....	2 00	1 00
Three water-melons.....	2 00	1 00
Three musk-melons.....	2 00	1 00
Three nutmeg-melons.....	2 00	1 00
Three citrons.....	2 00	1 00
Collection of three or more kinds of melons, and three or more of each kind.....	3 00	2 00
Five cucumbers.....	2 00	1 00
Half peck garden peas.....	2 00	1 00
Half peck Lima beans.....	2 00	1 00
Peck bush beans.....	2 00	1 00
Half peck wax beans.....	2 00	1 00
Collection of three or more kinds of garden beans, one-half peck or more of a kind.....	3 00	2 00
Dozen ears of early sweet corn.....	2 00	1 00
Dozen ears of late sweet corn.....	2 00	1 00
Dozen ears pop-corn.....	2 00	1 00
Six heads sunflower.....	2 00	1 00
Six stems Swiss chard.....	2 00	1 00
Six stems parsley.....	2 00	1 00
Six stems spinach.....	2 00	1 00
Six stems any sweet or pot herb.....	2 00	1 00
Collection of four or more kinds sweet or pot herb.....	3 00	2 90
Six stems kohlrabi.....	2 00	1 00

E—CLASS 27.—FLOUR, MEAL, AND FEED.

Barrel flour made of white wheat.....	\$5 00	\$3 00
Barrel flour made of red wheat.....	5 00	3 00
Barrel flour made of spring wheat.....	3 00	2 00
Sample bolted meal.....	2 00	1 00
Sample corn meal.....	2 00	1 00
Sample ground feed.....	2 00	1 00
Sample buckwheat flour.....	2 00	1 00
Sample rye flour.....	2 00	1 00
Sample graham flour.....	2 00	1 00
Sample oat meal.....	2 00	1 00
Best and largest display of flour, meal and feed.....	5 00	3 00

E—CLASS 28.—BUTTER AND CHEESE.

	1st Prem.	2d Prem.	3d Prem.
Best twenty-five pounds of domestic butter, made at any time.....	\$25 00	\$20 00	\$15 00
Best display of cheese, not less than three in number, from any household or private dairy.....	15 00	10 00	5 00
Best display of cheese by any factory, quality considered.....	Silver Medal and 35 00	25 00	15 00

E—CLASS 29.—CHEESE, HONEY, AND BEE HIVES.

Best gallon maple syrup.....	\$3 00	\$2 00
Best ten pounds maple sugar.....	5 00	3 00
Best specimen of honey, in boxes or jars.....	3 00	2 00
Best bee-hives, and method of securing honey and taking care of bees.....	Diploma and 5 00	
Best display of samples of commercial sugars and syrups, named and labeled.....	5 00	3 00

30.—BREAD AND PICKLES.

Best machine made bread.....	Diploma
Best three loaves of baker's bread.....	Diploma
	1st Prem. 2d Prem.
Best three loaves of milk or salt rising bread.....	\$3 00 \$2 00
Best three loaves of yeast bread.....	3 00 2 00
Best soda rising bread.....	3 00 2 00
Best corn bread.....	3 00 2 00
Best three loaves of brown bread, or rye and Indian.....	3 00 2 00
Best sample of flour bread, made by a girl of sixteen years or under.....	3 00 2 00
Best sample of brown bread, by a girl sixteen years or under.....	3 00 2 00
Best display of varieties of crackers, made by any one person.....	Diploma
Best display of specimens of pickled vegetables, including cucumbers, onions, cabbage, tomatoes, and beans.....	5 00 3 00

The Executive Committee esteem it of the utmost importance to encourage the arts which promote comfort and economy to the household. There will probably be many articles entered under this class which are not enumerated. Such articles as may be deemed meritorious the committee are instructed to act upon, and to make such awards as may seem just.

E—CLASS 31.—SOAPS, TOILET ARTICLES, SAMPLES OF PREPARED GROCERIES, ETC.

Best display of fine groceries.....	Diploma
Best display of toilet articles, including hair dyes, tooth powders and washes, hair oils, pomatum, and cosmetics.....	Diploma
Best display of toilet soaps.....	Diploma
Best display of washing soaps.....	Diploma
Best prepared pop-corn.....	Diploma
Best display of confectionery.....	Diploma
Best display of flavoring extracts.....	Diploma
Best display of ground spices.....	Diploma

E—CLASS 32.—MISCELLANEOUS.

All articles pertaining to Division E, not heretofore enumerated, shall be placed in this Class. Committee to be appointed on the ground.

DIVISION F—FARM IMPLEMENTS AND THEIR TRIALS.

A trial of implements and machinery in this division will not be required.

F—CLASS 33.—PLOWS.

Best plow for turning sod land or green sward.....	Diploma and	\$5 00
Best plow for turning under stubble.....		5 00
Best plow for general use made in Michigan.....	Diploma and	10 00
Best plow for general use made in any other State.....	Diploma and	5 00
Best heavy plow for new land.....	Diploma and	5 00
Best attachment for any plow for covering grass or long manure.....		5 00
Best subsoil plow.....	Diploma and	5 00
Best draining or ditching plow.....	Diploma and	5 00
Best self-cleaning plow coulter.....	Diploma	
Best attachment for any plow for subsoiling.....	Diploma	
Best gang plow.....	Diploma	
Best dynamometer.....	Diploma	
	1st Prem. 2d Prem. 3d Prem.	
Largest and best display of plows, to be exhibited by manufacturer.....	\$50 00	\$25 00 \$15 00

F—CLASS 34.—TILLAGE IMPLEMENTS.

F-CLASS 34.—TILLAGE IMPLEMENTS.			
Best field roller.....			\$5 00
Best harrow, for general use.....			5 00
Best iron harrow.....			3 00
Best wooden harrow.....			3 00
Best one-horse cultivator.....			3 00
Best machine for hoeing and weeding drills in garden.....			Diploma
	1st Prem.	2d Prem.	3d Prem.
Best display of cultivators exhibited by manufacturers.....	\$50 00	\$25 00	\$10 00

F—CLASS 35.—SEED DRILLS, SOWERS, PLANTERS, ETC.

	1st Prem.	2d Prem.
Best two-horse seed drill.....	\$25 00	\$15 00
Best two-horse broadcast seeder for grain.....	20 00	10 00
Best grass and clover seed sower for horse power.....		Diploma
Best ashes and plaster sower attached to horse power.....		Diploma
Best grass seed sower for hand work.....		Diploma
Best ashes and plaster sower for hand work.....		Diploma
Best corn and bean planter to work with horse power.....		Diploma
Best drill machine for sowing turnips, carrots, or beets, by horse power.....		Diploma
Best drill for sowing seeds of root crops by hand.....		Diploma
Best machine for sowing plaster, ashes, or artificial manure.....		Diploma
Best hand corn planter.....		Diploma

F—CLASS 36.—HAYING AND HARVESTING IMPLEMENTS.

	1st Prem.	2d Prem.	3d Prem.
Best horse rake.....	\$15 00	\$10 00	\$5 00
Best machine for mowing lawns by hand.....			Diploma
Best loading apparatus.....			Diploma
Best horse pitchfork.....			Silver medal
Best corn cutter, horse power.....			Diploma
Best contrivance for husking corn.....			Diploma
Best clover seed gatherer.....			Medal
Best hay rigging, for double wagon.....			Diploma
Best hay rigging for an ox or horse cart.....			Diploma
Best potato digger.....			\$10 00
For any machine that will dig potatoes by horse power, any method satisfactory to the committee.....			Silver medal
Best hay press.....			Silver medal

NOTE.—By resolution of the Executive Committee, at its annual meeting, all premiums on mowers and reapers were ordered stricken out of the premium list; but all parties desiring to exhibit their machines are to have every facility offered them. It was deemed only just, that as no fair trial could be made at the season of the fair, no award should be made giving one machine a preference over another.

F—CLASS 37.—APPARATUS AND MACHINES CONNECTED WITH THE CLEANING AND PREPARATION OF CROPS FOR MARKET AND FOR THE FEEDING OF STOCK.

	1st Prem.	2d Prem.
Best horse power for farm use.....	\$25 00	\$15 00
Greatest and best display of feed cutters.....	20 00	10 00
Greatest and best display of corn shellers.....	20 00	10 00
Best fanning mill or grain cleaner.....		Diploma
Best straw and stalk cutter for hand power.....		Diploma
Best root cutter.....		Diploma
Best machine for pulping roots, that they may be mixed with cut straw, hay, or chaff.....		Diploma
Best, simplest, and most substantial contrivance for steaming food for cattle and hogs, not less than twenty head of each.....		Medal
Best contrived feeding rack for sheep.....		Diploma
Best plan for feeding swine.....		Diploma
Best plan for feeding calves.....		Diploma
Best portable cider mill.....		Diploma
Best portable steam engine, to be used for agricultural purposes.....	Diploma and	Medal
Best portable grist mill.....		Medal
Best apparatus for evaporating maple syrup.....		Medal
Best hop press.....		Medal
Best hay or cattle scales, to be placed near the forage and cattle for use of the Society.....		Medal and \$20 00

F—CLASS 38.—MISCELLANEOUS FARM ARTICLES.

All miscellaneous farm articles pertaining to this division to be enumerated under this class, and the committee will make such recommendations as they may deem proper.

Best drag sawing machine.....	\$20 00
Best circle sawing machine.....	20 00
Best stump puller, capable of lifting ten tons.....	20 00
Best grubbing machine.....	Diploma
Best one-half dozen spading forks.....	\$2 00
Best one-half dozen four tine manure forks.....	2 00
Best one-half dozen six tine manure forks.....	2 00
Best one-half dozen three tine straw forks.....	2 00
Best one-half dozen four tine straw forks.....	2 00
Best one-half dozen two tine straw forks.....	2 00
Best one-half dozen socket hoes.....	2 00
Best one-half dozen shank hoes.....	2 00
Best one-half dozen steel tooth garden rakes.....	2 00
Best one-half dozen potato hooks.....	2 00
Best assortment of garden tools.....	2 00
Best set of draining or ditching tools.....	2 00
Best set of grafting tools.....	2 00
Best road scraper.....	2 00
Best pump and power combined.....	Diploma and 10 00
Best windmill (ten feet wheel) and pump.....	Medal
Best three horse clevis.....	\$1 00
Best wheelbarrow.....	2 00
Best six hand corn cutters.....	1 00
Best six grub hoes.....	2 00
Best hand machine for sawing wood.....	2 00
Best grain cradle.....	2 00
Best six shovels.....	2 00
Best six spades.....	2 00
Best six axes.....	2 00
Best set of grain measures.....	1 00
Best ox yoke.....	1 00
Best six bush hooks.....	2 00
Best grind stone with best hangings.....	2 00
Best fruit ladders.....	1 00
Best fruit gatherers.....	1 00
Best hand pump for wells.....	2 00
Best water lifter for wells.....	1 00
Best cistern pump.....	1 00
Best farm gate.....	1 00
Best farm fence.....	1 00

F—CLASS 39.—DAIRY AND HOUSEHOLD ARTICLES.

Best churn for making butter, either rotary or other movement.....	Diploma
Best cheese press.....	Diploma
Best milk pans, not less than six.....	\$1 00
Best cheese vat, for cheese making.....	Diploma
Best milk strainer.....	\$1 00
Best milk safe.....	Diploma
Best dozen brooms.....	\$1 00
Best six mops and handles.....	1 00
Best weights and scales for dairy use.....	1 00
Best washing machine.....	2 00
Best clothes wringing machine.....	1 00
Best clothes horse.....	1 00
Best assortment of wooden ware for dairy or kitchen use.....	Diploma
Best assortment of tin or metal ware for dairy or kitchen use.....	Diploma
Best hand loom.....	\$1 00
Best fruit dryer.....	Diploma
Best coffee burner.....	\$1 00
Best clothes sprinkler.....	1 00
Best water filter and cooler.....	1 00
Best fruit boxes for grapes and other small fruit.....	1 00
Best metal cans for preserving fruit.....	1 00
Best glass cans for preserving fruit.....	1 00
Best specimens of dish covers.....	1 00

Best cheese safe.....	\$1 00
Best corn popper.....	1 00
Best egg beater.....	1 00
Best refrigerator.....	1 00
Best clothes dryer.....	1 00
Best clothes mangle.....	1 00
Best half dozen wooden pails.....	1 00
Best half dozen wash tubs.....	1 00
Best machine for working butter.....	1 00

DIVISION G—VEHICLES.

G—CLASS 40.—WAGONS AND CARRIAGES.

		1st Prem.	2d Prem.
Two-horse family carriage.....	Diploma and	\$10 00	\$5 00
One-horse carriage.....	Diploma and	5 00	5 00
Two spring phaeton.....	Diploma and	5 00	5 00
Three spring phaeton.....	Diploma and	5 00	5 00
Top buggy.....	Diploma and	5 00	5 00
Buggy without top.....	Diploma and	5 00	5 00
Trotting wagon.....	Diploma and	5 00	5 00
Trotting sulky.....	Diploma and	5 00	5 00
Farm wagon for all purposes.....		10 00	5 00
Spring wagon for market.....		10 00	5 00
Omnibus.....		10 00	5 00
Two-horse family sleigh.....		10 00	5 00
Single sleigh or cutter.....		5 00	3 00
Single farm wagon.....		5 00	3 00
Horse cart.....		5 00	3 00
Ox cart.....		5 00	3 00
Dray.....		5 00	3 00
Pair of bob sleighs for lumbering.....			Diploma
Trucks for lumbering purposes.....			Diploma
Carriage jack.....			Diploma
For best display of the above articles.....		25 00	15 00

DIVISION H—MACHINERY.

H—CLASS 41.—MACHINERY FOR WORKING UPON IRON AND OTHER METALS.

Steam engine.....	Medal
Iron planer.....	Diploma
Iron lathe.....	Diploma
Iron Shaping machine.....	Diploma
Iron boring machine.....	Diploma
Iron drilling machine.....	Diploma
Machine for cutting threads on bolts and nuts.....	Medal
Fan blower.....	Diploma
Portable forge.....	Diploma
Shafting.....	Diploma
Hangers and pulleys.....	Diploma
Self-oiler for machines.....	Diploma
Governor for engines.....	Medal
Low water detector.....	Medal
Coupling for shafting.....	Medal
Steam valves.....	Medal
Flue scraper and cleaner.....	Medal

Machinery for Working Upon Wood.

Saw mill.....	Medal
Circular saw.....	Medal
Upright saw.....	Medal
Saw-gummer.....	Diploma
Cross-cut saw.....	Diploma
Log turner.....	Medal
Lath sawing machine.....	Medal

Machine for edging lumber.....	Diploma
Machine for making shingles.....	Diploma
Belt fastening machine.....	Medal
Scroll saw.....	Diploma
Belting.....	Diploma
Planer and matcher.....	Medal
Dovetailing machine.....	Diploma
Tenoning machine.....	Diploma
Morticing machine.....	Diploma
Heading machine.....	Diploma
Stave cutting machine.....	Medal
Clothes-pin machine.....	Diploma
Saw mill head blocks.....	Diploma
Surface planer.....	Medal
Spoke dressing machine.....	Diploma
Moulding machine.....	Diploma
Stave jointer.....	Medal
Heading jointer.....	Medal
Blind wiring machine.....	Medal
Broom-handle lathe.....	Diploma
Automatic lathe.....	Diploma
Foot-power lathe.....	Diploma

Miscellaneous Machinery.

Machine for making brick.....	Diploma
Steam printing press.....	Medal
Card printing press.....	Medal
Press brick machine.....	Medal
Steam tile machine.....	Diploma
Machine for making rope and cordage.....	Diploma
Turbine water wheel.....	Diploma
Grocer's coffee mill.....	Diploma
Machine for ruling paper.....	Diploma
Paint mill.....	Diploma
Steam fire engine.....	Medal
Hand fire engine.....	Diploma
Garden engine.....	Medal
Emery wheel.....	Medal

All models, of whatever kind, must be entered in this class, and the Viewing Committee will examine them, report on them, and, if considered worthy, a diploma or certificate of the society will be awarded by such committee.

All new and meritorious inventions in machinery not elsewhere classified may be entered in this class, and will be reported upon by the Viewing Committee, who are empowered to recommend such premiums as they may deem just.

H—CLASS 42.

Passenger engine.....	Silver medal
Freight engine.....	Silver medal
Passenger car for service.....	Diploma
Car for transportation of live stock.....	Diploma
Combination freight car.....	Diploma
Sleeping car for passengers.....	Diploma
Drovers' car.....	Diploma
Fruit car.....	Silver medal

ENTRIES IN CLASS 8.

As the inventions to be made cannot be designated, there may be awarded in this class of entries to such valuable and new improvements, by residents of the State of Michigan, as in the view of the committee will tend to recognize and encourage effort in this direction--the highest premium awarded by the Society, viz.: a silver medal; and such premium shall be limited and awarded within the following classification, viz.:

- The best new article for working upon iron and other metal.
- The best new article for working upon wood.
- The best new article relating to hydraulics.
- The best new article relating to steam.

The best new article relating to astronomical or mathematical instruments.

The best new article relating to navigation.

The best new article relating to agriculture.

DIVISION I—DEPARTMENT OF MANUFACTURED GOODS.

The Viewing Committee shall examine all entries belonging to their respective Classes not enumerated in the premium list, and may recommend the award of discretionary premiums to articles of superior merit.

I—CLASS 43.—HOME MADE.

	1st Prem.	2d Prem.
Pair woolen blankets.....	\$3 00	\$2 00
Ten yards of woolen cloth.....	3 00	2 00
Ten yards of woolen flannel.....	3 00	2 00
Ten yards of woolen carpet.....	3 00	2 00
Hearth rug.....	2 00	1 00
Ten yards of rag carpet.....	3 00	2 00
Woolen coverlet.....	3 00	2 00
Ten yards of satinete.....	3 00	2 00
Pair of woolen stockings.....	1 00	50
Pair of woolen mittens.....	1 00	50
Pair of woolen gloves.....	1 00	50
Two pounds of stocking yarn.....	2 00	1 00
Pair cotton socks.....	1 00	50
Cotton stockings.....	1 00	50
White table cloth.....	2 00	1 00
Pair of woolen shirts.....	2 00	1 00
Ten yards of diaper.....	3 00	2 00
Ten yards of tow cloth.....	3 00	2 00
Best and greatest variety of articles manufactured by any one family, but not containing any article entered separately for single premi- ums, or that has been exhibited at any previous State Fair.....	10 00	5 00

I—CLASS 44.—FACTORY MADE.

	1st Prem.	2d Prem.	3d Prem.
Display of goods from any woolen factory in Michigan.....	\$15 00	\$10 00	\$5 00
Piece of fancy cassimere, weighing twelve ounces or over per yard.....	3 00	2 00	
.....Diploma and			
Piece of plain cassimere, weighing twelve ounces or over per yard.....	3 00	2 00	
.....Diploma and			
Best and largest display of flannels made by any one Factory in Michigan.....	3 00	2 00	
.....Diploma and			
Best piece of overcoat cloth, weighing twelve ounces or over per yard.....	3 00		
.....Diploma and			
Best piece of broadcloth manufactured in Michigan, Medal and	3 00		
Best display of cotton or silk goods, manufactured in or out of the State.....	3 00		
.....Medal and			
Best display of cotton goods, manufactured in Michi- gan.....	5 00		
.....Medal and			
Best and handsomest display of carpets.....	3 00	2 00	
.....Diploma and			
Best twenty-five yards of wool carpet, manufactured in Michi- gan.....	5 00	3 00	
.....Diploma and			
Best display of woolen manufactured coverlet, not previ- ously shown.....		3 00	
.....Diploma and			
Best and handsomest five hearth rugs.....			Diploma
Best and handsomest five fancy door mats.....			Diploma
Best display of window curtains.....			Diploma
Best and finest display of window shades.....			Diploma
Best display of oil cloths.....			Diploma
Best white woolen blankets.....			Diploma
Best two Marseilles quilts.....			Diploma
Best display of paper hangings.....			Diploma
Best display of cotton batting.....			Diploma

I—CLASS 45.—ARTICLES OF DRESS.

	1st Prem.	2d Prem.
Best suit of Men's Clothes, including coat, vest, and pantaloons.....	Diploma and \$3 00	\$2 00
Best made overcoat.....	3 00	
Best made dress coat.....	3 00	
Best made frock coat.....	3 00	
Best three undershirts and drawers of flannel.....	1 00	
Best three undershirts and drawers of cotton.....	1 00	
Best three undershirts and drawers of silk.....	1 00	
Best made shirts, five in number.....	2 00	
Best display straw hats.....	1 00	
Best display silk hats.....		Diploma
Best display fur hats.....		Diploma
Best display soft hats.....		Diploma
Best display boys' caps.....		Diploma
Best display gents' furs.....		Diploma

I—CLASS 46.—ARTICLES OF LEATHER AND INDIA RUBBER.

	1st Prem.	2d Prem.
Best traveling trunk.....	\$3 00	\$2 00
Best carpet bag.....	1 00	
Best lady's sachel.....	1 00	
Best pair of gents' summer boots.....	1 00	
Best pair gents' winter boots.....	1 00	
Best pair kip boots.....	1 00	
Best pair of lady's summer walking boots.....	1 00	
Best pair lady's winter walking boots.....	1 00	
Best pair of lady's winter shoes.....	1 00	
Best pair of gent's slippers.....	1 00	
Best pair of lady's slippers.....	1 00	
Best double carriage harness.....	Diploma and 3 00	2 00
Best single or buggy harness.....	Diploma and 3 00	2 00
Best double harness for farm.....	Diploma and 3 00	2 00
Best single harness for farm.....	2 00	1 00
Best cart harness.....	2 00	
Best sole leather.....	1 00	
Best calf skin.....	1 00	
Best other kinds of leather.....	1 00	
Best morocco leather.....	1 00	
Best gent's riding saddle.....	2 00	
Best lady's riding saddle.....	2 00	
Best horse collar.....	1 00	
Best leather belting.....		Diploma
Best rubber belting.....		Diploma
Best display of boots and shoes of all kinds.....		Medal
Best display of traveling bags.....		Diploma
Best fancy buffalo robe.....	1 00	
Best fancy blanket.....	1 00	
Best enameled leather.....	1 00	
Best assortment of India rubber goods.....		Diploma

Displays must not include any competing for single premiums.

I—CLASS 47.—ARTICLES OF FURNITURE.

Set parlor furniture, not less than seven pieces.....	Diploma and \$8 00	\$5 00
Sofa.....	3 00	2 00
Lounge or couch.....	3 00	2 00
Easy chair.....	3 00	2 00
Smoking or lounging chair.....	3 00	2 00
Upholstered reception chair.....	3 00	2 00
Center table.....	3 00	2 00
Library table.....	3 00	2 00
Pier mirrors and base.....	5 00	3 00
Mantel mirror.....	5 00	3 00
Window cornice.....	2 00	1 00
Lamperquin.....	2 00	1 00

	1st Prem.	2d Prem.
Set chamber furniture not less than three pieces.....	Diploma and \$8 00	\$5 00
Spring mattress.....	2 00	1 00
Mattress for bed.....	2 00	1 00
Dressing bureau.....	3 00	2 00
Set dining room chairs.....	3 00	2 00
Extension table.....	3 00	2 00
Sideboard.....	3 00	2 00
Book case.....	3 00	2 00
Secretary.....	3 00	2 00
Parlor writing desk.....	3 00	2 00
Office desk.....	3 00	2 00
Office chair.....	2 00	1 00
Desk of any kind.....	3 00	2 00
Hall-tree or hat rack.....	2 00	1 00
Display of furniture of all kinds.....	Diploma and 5 00	3 00
Set willow or rattan furniture.....		Diploma
Child's crib.....	2 00	\$1 00
Child's carriage.....	2 00	1 00
Display of children's willow or rattan chairs.....		Diploma
Display of veneers.....		Diploma
Display of rustic woodwork.....		Diploma
School seat and desk.....		Diploma
Assortment of school furniture.....		Medal
Billiard table.....		Medal and diploma

I—CLASS 48.—STOVES, IRON WORK, AND ORNAMENTAL CONCRETE WORK.

Best display of stoves.....	Silver medal	
Best cooking stove for wood fire.....	Medal	
Best cooking stove for coal fire.....	Medal	
	1st Prem.	2d Prem.
Best parlor or hall stove.....	\$3 00	\$2 00
Best self-regulating stove for parlor.....	3 00	2 00
Best office or depot stove.....	3 00	2 00
Best assortment of hollow ware.....	Diploma	
Best apparatus for cooking range.....	Diploma	
Best furnace or other apparatus for warming houses—economy of construction, consumption of fuel, security to premises, and facility of ventilation, to be taken into consideration.....	Silver medal	
Base-burning coal stove.....	Diploma	

Exhibitors of stoves will be at liberty to show the capacity of the articles entered by actual trial on the ground, if they prefer to do so.

Best ornamental cast iron vase on pedestal.....	\$3 00
Best cast iron gate.....	3 00
Best display of iron work.....	Diploma
Best cast iron fence.....	\$3 00
Best ornamental fountain.....	2 00
Best parlor grate.....	2 00
Best casting for fire front.....	2 00
Best ornamental iron statuary.....	2 00
Best iron chair.....	1 00
Best fruit and flower stand.....	1 00
Best display of rustic work.....	2 00
Best galvanized iron cornice.....	2 00
Best window and door sills of concrete or terra cotta work.....	Diploma
Best ornamented vases, concrete or terra cotta work.....	Diploma
Best display of concrete or terra cotta work.....	Medal

DIVISION J.—MUSICAL INSTRUMENTS AND SEWING MACHINES.

CLASS 49.

A fine building is provided for the exhibition of these goods, but no awards will be made.

DIVISION K.—PAINTING, NEEDLE WORK, ETC.

CLASS 50.—PAINTINGS AND SCULPTURE.

Articles in this class will be numbered and catalogued for the assistance of visitors.

	1st Prem.	2d Prem.
Historical painting in oil, done by exhibitor.....	\$5 00	\$3 00
Composition landscape in oil, done by exhibitor.....	5 00	3 00
Landscape from nature, in oil, done by exhibitor.....	3 00	2 00
Marine scene, in oil, done by exhibitor.....	3 00	2 00
Animal piece, from life, in oil, done by exhibitor.....	3 00	2 00
Bird piece, in oil, done by exhibitor.....	3 00	2 00
Fruit piece, in oil, done by exhibitor.....	2 00	1 00
Portrait, from life, large size, in oil, done by exhibitor.....	5 00	3 00
Portrait, from life, cabinet size, in oil, done by exhibitor.....	3 00	2 00
Fancy painting, in oil, done by exhibitor.....	3 00	2 00
Head, cabinet size, in oil, done by exhibitor.....	2 00	1 00
Oil painting, by person under sixteen, done by exhibitor.....	3 00	2 00
Landscape painting, in water colors, done by exhibitor.....	3 00	2 00
Portrait painting, in water colors, done by exhibitor.....	3 00	2 00
Animal painting, in water colors, done by exhibitor.....	3 00	2 00
Fancy painting, in water colors, done by exhibitor.....	3 00	2 00
Historical painting, shown by any person.....	2 00	1 00
Landscape painting, shown by any person.....	2 00	1 00
Marine painting, shown by any person.....	2 00	1 00
Portrait, in oil, shown by any person.....	2 00	1 00
Other paintings in oil, shown by any person.....	2 00	1 00
Water color paintings, shown by any person.....	2 00	1 00
Collection of oil paintings, not less than five in number, by a person not a dealer.....	5 00	3 00
Collection of water color paintings, not less than five in number, by a person not a dealer.....	3 00	2 00
Collection of oil paintings, by any dealer or association, twenty-five or more, owned in Michigan.....	10 00	5 00
Collection of water color paintings, by any dealer or association, twenty-five or more, owned in Michigan.....	5 00	3 00
Pastel painting of face.....	2 00	1 00
Pastel painting of animal.....	2 00	1 00
Pastel painting of landscape.....	2 00	1 00
Crayon drawing of face.....	2 00	1 00
Crayon drawing of animal.....	2 00	1 00
Crayon drawing of landscape.....	2 00	1 00
Collection of photographs by any person..... Diploma and	3 00	2 00
Portrait photograph, life size.....	2 00	1 00
Landscape photograph.....	2 00	1 00
Animal photograph.....	2 00	1 00
Portrait photograph, colored.....	2 00	1 00
Three cabinet photographs.....	2 00	1 00
One-half dozen miniature photographs.....	2 00	1 00
One-half dozen miniature porcelain photographs.....	2 00	1 00
Collection of lithographs, not less than five in number.....	3 00	2 00
Single lithograph.....	2 00	1 00
Engraving, steel plate.....	3 00	2 00
Engraving, wood cut.....	2 00	1 00
Pencil drawing, full animal.....	2 00	1 00
Pencil drawing, landscape.....	2 00	1 00
Pencil drawing by a person under fourteen years.....	2 00	1 00
Best drawing of any animal upon the grounds.....	3 00	2 00
Best drawing of any building upon the grounds.....	3 00	2 00
India ink drawing.....	3 00	2 00
Specimen architectural drawing.....	3 00	2 00
Specimen machinery drawing.....	3 00	2 00
Specimen naval drawing.....	3 00	2 00
Specimen crayon drawing.....	3 00	2 00
Practical penmanship, by gentleman.....	2 00	1 00
Practical penmanship, by lady.....	2 00	1 00

	1st Prem.	2d Prem.
Specimen of penmanship, by boy or girl under 15 years of age.....	\$3 00	\$2 00
Sample etching on glass.....	2 00	1 00
Sample gilding on glass.....	2 00	1 00
Sign painting.....	3 00	2 00
Window shade painting.....	2 00	1 00
Collection imitation of wood and marble.....		Diploma
Display of gilt frames.....		Diploma
Display of artist's materials.....		Diploma
Collection of chromos, not less than ten in number.....	Diploma and 3 00	\$2 00
Chromo landscape.....	2 00	1 00
Chromo portrait.....	2 00	1 00
Chromo of animals or birds.....	2 00	1 00
Chromo of fruit.....	2 00	1 00
Set stereoscopic views.....	2 00	1 00
Plan for city and suburban residence, with specifications and cost.....		Diploma
Plan for farm house, with specifications and cost.....		Diploma
Plan for farm barn, with specifications and cost.....		Diploma
Plan for union and ward school-houses, etc, with specifications and cost.....		Diploma
Plan for district and ward school-house, with specifications and cost.....		Diploma
Plan for poultry house for 50 or more fowls, with specifications and cost.....		Diploma
Plan for other farm buildings, with specifications and cost.....		Diploma
Plan for a county agricultural society grounds.....		Diploma
N. B.—Commercial colleges will not be allowed to compete for the penmanship premiums, nor will premiums be awarded to such colleges, but ample room for display will be given them.		

K—CLASS 51.—PHILOSOPHICAL, SURGICAL AND OTHER INSTRUMENTS AND APPARATUS.

Display of optical instruments.....	Diploma
Display of school apparatus.....	Diploma
Set surveyor's instruments.....	Diploma
Set mathematical instruments.....	Diploma
Set drawing instruments.....	Diploma
Set dental instruments.....	Diploma
Set surgical instruments.....	Diploma
Electric telegraph apparatus.....	Diploma
Magnetic apparatus.....	Diploma
Galvanic apparatus.....	Diploma
Meteorological apparatus.....	Diploma
Set hydrometers and sacchronometers.....	Diploma
Artificial teeth.....	Diploma
Artificial leg or arm.....	Diploma
Display set of artificial teeth on gold.....	Diploma
Display set of artificial teeth on rubber.....	Diploma
Display of dental work.....	Diploma
Display spectacles.....	Diploma
Telescope.....	Diploma
Microscope.....	Diploma
Thermometer.....	Diploma
Barometer.....	Diploma
Set of globes for school use.....	Diploma
Set of mathematical solids.....	Diploma
Display of chemicals.....	Diploma
Display of dyes.....	Diploma
Display of medical drugs.....	Diploma
Display of fine perfumery.....	Diploma

K—CLASS 52.—CLOCKS, JEWELRY, PLATED WARE, CUTLERY, ETC.

	1st Prem.	2d Prem.
Best exhibition of clocks for household use or parlor ornament,		
Diploma and	\$3 00	\$2 00
Best exhibition of silver and plated ware.....	5 00	3 00
Best exhibition of table cutlery.....	2 00	
Best display of American watches.....	3 00	2 00
Best exhibition Britannia ware.....	2 00	1 00

Best case of jewelry.....	Diploma
Best case of gold pens.....	Diploma
Best exhibition of bronze ware.....	Diploma
Best exhibition of fancy glass ware.....	Diploma

K—CLASS 53.—ARTICLES OF LADIES' DRESS.

	1st Prem.	2d Prem.
Display millinery goods.....	\$5 00	\$3 00
Trimmed lady's hat.....	3 00	2 00
Trimmed bonnet.....	3 00	2 00
Trimmed straw hat.....	2 00	1 00
Ladies' walking dress.....	3 00	2 00
Evening dress.....	3 00	2 00
Skirt.....	2 00	1 00
Suit of under garments.....	3 00	2 00
Set of under-sleeves and collar.....	2 00	1 00
Corset.....	2 00	1 00
Cloak.....	2 00	1 00
Waterproof.....	2 00	1 00
Misses' suit.....	3 00	2 00
Child's suit.....	3 00	2 00
Infant's suit.....	2 00	1 00
Display lady's kid gloves.....	2 00	1 00
Pair lady's fur gloves.....	2 00	1 00
Lady's boa.....	2 00	1 00
Lady's fur muff.....	2 00	1 00
Lady's fur cape.....	2 00	1 00
Greatest display of ladies' dress goods.....		Diploma

K—CLASS 54.—PLAIN NEEDLE AND MACHINE WORK.

Specimen of plain needle work.....	\$3 00	\$2 00
Fine shirt, all by hand.....	2 00	1 00
Fine skirt, all by hand.....	2 00	1 00
Night dress, all by hand.....	2 00	1 00
Pair of plain handkerchiefs.....	1 00	
Silk patchwork quilt, by hand.....	3 00	2 00
Calico patchwork quilt, by hand.....	2 00	1 00
Worsted patchwork quilt, by hand.....	2 00	1 00
Plain white muslin quilt, by hand.....	2 00	1 00
Plain quilt of any other kind, by hand.....	2 00	1 00
Gent's quilted dressing gown, by hand.....	2 00	1 00
Pair of plain sheets, by hand.....	2 00	1 00
Pair of plain pillow cases or covers.....	2 00	1 00
Best set pillow shams.....	2 00	1 00
Sample braiding, by hand.....	2 00	1 00
Best specimen of hem stitching.....	2 00	1 00
Plain sewing, by a girl under 14.....	2 00	1 00
Sample of patched garment.....	2 00	1 00
Darned stocking.....	2 00	1 00
Ironed and done up shirt.....	2 00	1 00
Plain sewing by machine.....	2 00	1 00
Fine shirt by machine.....	2 00	1 00
Fine skirt by machine.....	2 00	1 00
Infant's dress and skirt by machine.....	2 00	1 00
Sample ornamental work by machine.....	3 00	2 00
Bed quilt made and quilted by machine.....	3 00	2 00
Sample braiding by machine.....	2 00	1 00
Machine work must be done by ladies not machine agents.		

K—CLASS 55.—EMBROIDERY AND ORNAMENTAL NEEDLE WORK.

	1st Prem.	2d Prem.
Best and largest collection of ornamental needle work or embroidery done by one person.....	\$8 00	\$5 00
Specimen embroidered infant's dress or skirt, in cotton or linen.....	2 00	1 00
Specimen embroidered pillow cases or covers, in cotton or linen.....	2 00	1 00
Specimen embroidered lady's skirt, in cotton or linen.....	2 00	1 00

	1st Prem.	2d Prem.
Specimen embroidered lace veil or cape.....	\$2 00	\$1 00
Specimen embroidered lace curtains.....	2 00	1 00
Specimen embroidered undersleeves, in cotton or linen.....	2 00	1 00
Specimen embroidered night dress, in cotton or linen.....	2 00	1 00
Specimen embroidered infant's blanket, in cotton or linen.....	2 00	1 00
Specimen embroidered handkerchief, in cotton or linen.....	2 00	1 00
Specimen embroidered letters in marking, in cotton or linen.....	1 00	50
Set embroidered table mats, in cotton or linen.....	2 00	1 00
Specimen embroidered infant's dress or skirt, in silk.....	2 00	1 00
Specimen embroidered infant's blanket, in silk.....	2 00	1 00
Specimen embroidered ottoman or chair cover, in silk.....	2 00	1 00
Specimen embroidered piano or table cover, in silk.....	2 00	1 00
Specimen embroidered slippers, in silk.....	2 00	1 00
Specimen embroidered book mark.....	1 00	50
Specimen embroidered letters in marking, in silk.....	1 00	50
Specimen embroidered dressing gown, in silk.....	2 00	1 00
Specimen embroidered lady's dress or robe, in silk.....	2 00	1 00
Specimen Mosaic-work.....	2 00	1 00
Specimen chenelle embroidery in silk.....	2 00	1 00
Sample pictures worked in worsted.....	3 00	2 00
Sample cut or raised work, in worsted.....	2 00	1 00
Sample of splashing in worsted.....	2 00	1 00
Sample pair toilet mats in worsted.....	2 00	1 00
Sample pair lamp mats in worsted.....	2 00	1 00
Combined fire screen in worsted.....	2 00	1 00
Sample toilet cushion, in worsted.....	2 00	1 00
Sample chair or ottoman cover, in worsted.....	2 00	1 00
Sample pair slippers.....	2 00	1 00
Sample embroidered table or piano spread, in worsted.....	2 00	1 00
Sample embroidered sofa or pillow cover, in worsted.....	2 00	1 00
Sample work on perforated board, in worsted or silk.....	2 00	1 00
Sample chair tidy, in worsted.....	2 00	1 00
Sample towel rack.....	2 00	1 00
Sample embroidered bracket.....	2 00	1 00
Sample embroidered wall basket.....	2 00	1 00

K—CLASS 56.—CROCHET, KNIT, AND FANCY WORK.

Largest and best collection of work in this class made by one person,	5 00	3 00
Gent's scarf.....	2 00	1 00
Boy's scarf.....	1 00	50
Afghan robe.....	3 00	2 00
Child's afghan robe.....	2 00	1 00
Cotton tidy.....	2 00	1 00
Worsted tidy.....	2 00	1 00
Pair crochet toilet mats.....	2 00	1 00
Pair crochet lamp mats.....	2 00	1 00
Crochet or knit hood.....	2 00	1 00
" " bedspread.....	2 00	1 00
" " shawl.....	2 00	1 00
" " flag.....	2 00	1 00
" " lady's sack.....	2 00	1 00
" " child's sack.....	2 00	1 00
" " infant's boots.....	1 00	50
" " infant's shirt.....	1 00	50
" " child's shirt.....	1 00	50
" " leggings.....	2 00	1 00
" " fancy mittens.....	2 00	1 00
" " child's cap.....	2 00	1 00
" " cloak.....	2 00	1 00
Fancy pin cushion.....	1 00	50
Fancy purse.....	2 00	1 00
Fancy pen wiper.....	1 00	50
Fancy bead worked hanging basket.....	1 00	50
Fancy bead cushion.....	1 00	50
Fancy bead book mark.....	1 00	50

K—CLASS 57.—HAIR, SHELL, AND WAX WORK.

	1st Prem.	2d Prem.
Best and largest display of hair work.....	\$3 00	\$2 00
Specimen of hair flowers.....	2 00	1 00
Specimen of hair embroidery.....	2 00	1 00
Hair wreath.....	2 00	1 00
Display of wax work.....	3 00	2 00
Display of wax flowers.....	2 00	1 00
Display of fruit in wax.....	3 00	2 00
Artificial flowers in silk, muslin, paper or feathers, each.....	2 00	1 00
Specimen worsted or chenille flowers.....	2 00	1 00
Display of fancy papier-mache work.....	2 00	1 00
Ornamental shell work.....	2 00	1 00
Crystalized mass work.....	2 00	1 00
Shell frame.....	2 00	1 00
Cone frame.....	2 00	1 00
Spatter pictures.....	2 00	1 00
Wreath of shell or seed flowers.....	2 00	1 00
Wreath of dried grasses and plants.....	2 00	1 00
Bouquet of dried grasses and plants.....	2 00	1 00
Specimen of fancy leather work.....	2 00	1 00
Display of hair dresser's work.....	Diploma and 3 00	2 00

K—CLASS 58.—PRINTING AND STATIONERY.

Best bound and printed set of school books.....	Diploma
Best specimen of cloth binding.....	Diploma
Best specimen of leather binding.....	Diploma
Best specimen of book printing.....	Diploma
Best set of blank books.....	Diploma
Best specimen of poster printing.....	Diploma
Best specimen of pamphlet printing.....	Diploma
Best specimen of card and bill printing.....	Diploma
Best specimen of ornamental printing.....	Diploma
Best set of outline maps.....	Diploma
Best display of fine stationery.....	Diploma
Best paper made from straw.....	Diploma
Best paper made from rags.....	Diploma
Best paper made from other material.....	Diploma
Best paper made for newspaper work.....	Diploma
File of best arranged and printed local newspaper.....	Diploma

	1st Prem.	2d Prem.	3d Prem.
Best local notice of the coming fair of 1876.....	\$50 00	\$30 00	\$20 00

Publishers of newspapers competing for the above local notice premiums, will forward a copy of the paper containing such notice to the Secretary, C. F. Kimball, Pontiac, Mich., till September 1st, 1876, after which date, to Secretary's office at Jackson.

N. B.—All diplomas should be applied for at the office of the Society, at Pontiac. If not applied for they will be sent by express on notification of address when it is possible to do so.

MISCELLANEOUS DIVISION.

L—CLASS 59.—MISCELLANEOUS ARTICLES.

Best collection of work in marble.....	Diploma and \$5 00
Best specimen of steel manufactured in the State.....	Medal
Best specimen of glass manufactured in the State.....	Medal
Best specimen of brass manufactured in the State.....	Medal
Best specimen of sawed lumber, not less than twenty boards, different varieties.....	Diploma and \$2 00
Best specimen of dressed lumber, not less than fifteen boards, different varieties.....	Diploma and 2 00
Best thousand of machine made shingles.....	Diploma and 2 00
Best collection of ten bunches of sawed lath.....	3 00
Best collection of fire brick.....	Diploma
Best collection of building stone, natural.....	Diploma

Best specimen one barrel stone lime.....	\$2 00
Best specimen one barrel marl lime.....	2 00
Best specimen one barrel water lime.....	2 00
Best specimen one barrel stucco lime.....	2 00
Best specimen building paper.....	Diploma
Best specimen concrete roofing.....	Diploma
Best specimen super-phosphate.....	Diploma
Best specimen ground bone.....	\$3 00
Best barrel fine salt.....	3 00
Best barrel packer's salt.....	3 00
Best sample table salt.....	3 00
Best fine kettle salt.....	3 00
Best solar salt.....	3 00
Best wrought iron fence, of Michigan manufacture.....	Silver medal
Best church bell.....	Diploma
Best steamboat bell.....	Diploma
Best locomotive bell.....	Diploma
Best hotel signal.....	Diploma
Best specimen of native copper, from mines in the State.....	Diploma and \$2 00
Best specimen of iron ore, from mines in the State.....	Diploma and 2 00
Best specimen of silver ore, from mines in the State.....	Diploma and 2 00
Best specimen of bituminous coal, from quarry in the State.....	Diploma and 2 00
Best specimen of anthracite coal, from quarry in the State.....	Diploma and 2 00
Best specimen of stone plaster, from quarry in the State.....	Diploma and 2 00
Best barrel of ground plaster, from quarry in the State.....	Diploma and 2 00
Best prepared drain, not less than two rods in length, upon the fair grounds, showing the drain neatly excavated, the tile laid down, the tile prepared for covering with earth, and a section completely covered, having the discharge open at the end, the exhibitors furnishing a statement of the cost of the tile, expense of preparation, etc., the drain not less than three feet deep, premium of.....	10 00
Best set of tools used in digging ditch, and laying the tile, premium of.....	3 00
Best machine for making tile, to be exhibited in complete working order and operation.....	Diploma and 10 00
Best self-operating swing.....	Diploma
Best lightning conductor.....	Diploma
Best specimen of concrete or artificial stone.....	Diploma
Best specimen of bricks made by hand or machinery.....	Diploma
Best and finest specimen of wood turning.....	Diploma
Best specimen of mineral paint.....	Diploma
Best cement roofing.....	Medal

DIVISION M.—SPECIMENS OF NATURAL HISTORY, ETC.

- Largest and best collection of birds, properly mounted, named, and labeled.
- Any collection of birds, properly mounted, named, and labeled.
- Single specimen of stuffed bird.
- Largest and best arranged display of insects, named and classified, showing which are injurious and which beneficial to crops, fruits, etc.
- Collection of fossils.
- Single specimen of fossil.
- Collection of any natural curiosities.
- Single specimen of any natural curiosity.

ANCIENT RELICS.

- Collection of articles or curiosities connected with the ancient Indian history of the country.
- Single specimen of ancient Indian curiosity.
- Collection of articles or implements connected with the colonial history of our country.
- Single specimen illustrative of colonial times.
- Collection of relics of the Revolutionary war.
- Single specimen of Revolutionary relics.
- Collection of articles and curiosities illustrative of the early Indian history of this State.

Single specimen of such Indian relics.

Articles or implements connected with the early French settlement of this State.

Collections or specimens of ancient coins or currency.

Ancient farm implements, or tools used in connection with any branch of industry.

Any article or curiosity illustrative of the dress, manners, education, and customs of ancient times.

Collection of relics of the late war.

Single specimen of such relics.

The committee intrusted with the management of this department of the State Fair will spare no pains in their endeavors to make it a complete success, and a very interesting feature of the exhibition.

No time could be more appropriate for bringing together these specimens of natural history, and the curiosities and relics of the past, than this centennial year, and no place more suitable than at our State Fair, where more of all classes of the citizens of our State will meet than will be gathered together at any other time or place during the year.

And in order to ensure success, and make this part of the fair both interesting and instructive, we most earnestly ask the coöperation of all societies or individuals in this State who have in their possession any of the above mentioned collections or specimens of natural history, or any of the various classes of relics, or any other article or articles, ancient or curious, or illustrative of the manners, customs, domestic economy, and farm implements of early times, and invite them to bring the same to the fair for exhibition in this department.

Each article to be accompanied, as far as possible, with its appropriate history. Articles forwarded to this department of the exhibition, by parties who cannot themselves accompany them, will be carefully cared for by the committee.

Parties having in their possession any of the above enumerated articles, and designing to exhibit the same, will confer a favor by notifying the chairman of the committee, at Ypsilanti, Mich., of the fact, so that the committee will be the better prepared to judge of the amount of space that will be required for this department of the exhibition.

Discretionary premiums, consisting mostly of diplomas and medals, will be recommended by the committee for meritorious articles and collections.

The President announced the following Executive Superintendents:

Cattle Department—Geo. W. Phillips.

Horse Department—A. O. Hyde, D. W. Howard.

Sheep and Swine Department—E. W. Rising, A. F. Wood.

Poultry and Miscellaneous Department—J. Q. A. Burrington.

Farm Implement Department—H. O. Hanford, Abel Angel.

Art Department—J. G. Ramsdell, Wm. L. Webber.

Music Department—C. L. Whitney.

Centennial Department—J. Webster Childs.

Manufacturers' Department—N. L. Avery, E. Van Valkenburgh.

Agricultural Department—F. M. Manning, R. G. Hart.

Machinery Department—Wm. M. Ferry.

Carriage Department—J. M. French.

Police and Gates—J. M. Sterling, A. J. Dean.

Forage—E. W. Rising.

Chief Marshal—C. W. Greene.

STANDING COMMITTEES.

On Business—J. M. Sterling, A. O. Hyde, W. L. Webber.

On Transportation—W. J. Baxter, J. M. Sterling.

On Finance—J. Webster Childs, E. W. Rising, E. Van Valkenburgh.

On Programme—W. J. Baxter, M. Shoemaker, Charles Kipp.

On Location of Fair—C. W. Greene, W. J. Baxter, F. M. Manning.

Moved and adopted that the President and Treasurer constitute the Committee on Printing.

Moved, by Mr. Dean, that the President and Business Committee be added to the Committee on Location.

Adopted.

Moved, by Mr. Baxter, that the following request be submitted to the Gov-

ernor by this committee: "That he will call the encampment of State troops for this centennial at the time and place of holding the State Fair of 1876."

Adopted.

Mr. Baxter offered the following resolution of instructions to locating committee, which, on motion, was adopted:

Resolved, That unless similar proposition for the holding of the next fair be made to the committee having the matter in charge providing necessary grounds, buildings, and financial facilities for the holding of the fair without any extra expense to the society, that before entering into any definite arrangement for the purpose, the matter be reported to the executive committee for consideration. In case satisfactory propositions are received in accordance with the foregoing resolution, the said committee be empowered to determine upon the place of holding the fair, and enter into the necessary contracts.

The Committee on Historical and Centennial Department reported as follows:

Your committee to whom was referred the following resolution:

Resolved, That in connection with the next annual fair of this Society, arrangements be made for a Historical and Centennial Department.

Respectfully report, that while it is exceedingly advisable that all articles suitable or desirable for exhibition in the department contemplated by the resolution, should, so far as possible, be forwarded to the Centennial Commission of this State, to be placed on exhibition at Philadelphia, and while your committee would earnestly endeavor to promote such Centennial Exhibition, and urge all who can do so, to avail themselves of the opportunity to enjoy and participate in the Centennial at Philadelphia, which is to be the grandest exhibition of the age, and not to be repeated during our life-time, still, we believe the proposed exhibition at our State Fair will call out a very large, valuable, and interesting exhibition of articles and implements, that would otherwise remain hidden or in obscurity, and will largely contribute to the interest and success of the fair. They therefore recommend the adoption of the resolution. They would further recommend that contributions for such exhibition be solicited, of all articles and implements connected with our Indian, Colonial, Revolutionary, and late wars—Indian, French, and other relics and curiosities—fossils and natural curiosities—collections and specimens illustrative of natural history, such as birds, insects, etc., properly put up, classified, and labeled, showing such as are beneficial and such as are injurious to fruit, etc. Also, articles illustrative of the early manners, customs, education, dress, implements of husbandry, etc., and in general all articles and implements employed in earlier times for use or ornament. That a building or such portion of a building as shall be necessary for the purpose, be set apart for such exhibition, and the department be put in charge of a special superintendent. Also, that the entire matter be put in charge of a committee of five, of whom such superintendent shall be chairman, to be appointed by the President, and arrange all details, with authority to such committee to recommend discretionary premiums, to consist largely of diplomas and medals, for meritorious collections and articles. Also, that such committee be instructed, if practicable, to make provision for personification of early manners, customs, and traits, in dress, domestic economy, etc., and so add to the value and interest of the exhibition.

J. WEBSTER CHILDS,

WM. M. FERRY,

W. J. BAXTER,

Committee.

The following resolutions were offered by Secretary Kimball and adopted:

Resolved, That the thanks of the Executive Committee be and are hereby tendered to the reporters of the Daily Post, Tribune, and Free Press and the proprietors and editors of those papers for their very full and correct reports of the proceedings of this winter meeting.

Resolved, That the thanks of the committee be due and are hereby tendered to the proprietors of the Russell House for their very courteous and hospitable entertainment of the committee during the meeting.

On motion of Judge Ramsdell, which was adopted, the salary of the Secretary for the ensuing year was fixed at \$1,000.

On motion, adjourned *sine die*.

C. F. KIMBALL, *Secretary*.

FALL MEETING AT JACKSON.

September 18, 1876.

The Executive Committee of the Michigan State Agricultural Society convened at Secretary's office. Called to order by President Humphrey.

Roll called, and the following members of the committee answered to their names:

President—E. O. Humphrey, Kalamazoo.

Secretary—C. F. Kimball, Pontiac.

Treasurer—A. J. Dean, Adrian.

Geo. W. Phillips, Romeo.

E. W. Rising, Davison Station.

J. M. Sterling, Monroe.

C. W. Greene, Farmington.

Wm. M. Ferry, Grand Haven.

A. O. Hyde, Marshall.

C. L. Whitney, Muskegon.

Amos F. Wood, Mason.

J. Q. A. Burrington, Vassar.

F. M. Manning, Paw Paw.

Wm. L. Webber, East Saginaw.

Abel Angel, Bradley.

D. W. Howard, Pentwater.

H. O. Hanford, Plymouth.

J. Webster Childs, Ypsilanti.

The following communication from Mr. Van Valkenburgh, tendering his resignation as a member of the Executive Committee, was received and on motion of Mr. Hyde accepted:

HILLSDALE, MICH., April 26, 1876.

E. O. Humphrey, President Michigan State Agricultural Society:

SIR:—I hereby tender my resignation as a member of the Executive Committee of the Michigan State Agricultural Society. I am of the opinion that a large field of usefulness is open to me in another direction. Please announce this to the Executive Committee at their next meeting, and oblige

Respectfully yours,

E. VAN VALKENBURGH.

Mr. Sterling moved that the Committee on Programmes immediately provide a programme of the exhibition, including a grand cavalcade of all cattle and horses on the ground, on Wednesday, at two o'clock, P. M.

It was discussed very fully pro and con, and adopted.

Mr. Dean moved that the Executive Committee recommend the National Association to remove the suspension and reinstate Daniel Schuyler of Jackson, and the black mare "Maria," suspended by order of this Society, in 1875, for non-payment of entrance fees. Adopted.

Moved by Mr. Hanford, and adopted, that the Superintendent of Division A designate the number of additional cattle stalls required for the accommodation of exhibitors in his department, to the chairman of the Business Committee, and that the latter be instructed to provide such additional stalls.

Mr. Sterling moved that Mr. Manning's name be substituted for the chairman of the Business Committee in the above resolution.

Mr. Webber moved that the power supposed to have been vested in a general superintendent, alluded to in rule 11, page 10 of premium list, be vested in the President. Adopted.

Mr. Sterling moved that the election of officers be held in the speaker's stand on the fair grounds. Adopted.

Moved by Mr. Greene that the President be authorized to appoint the judges of election, required by rule first (1) page seven (7) of premium list. Adopted.

Moved that the above resolution be reconsidered. Adopted, and the motion laid upon the table.

Moved by Mr. Webber, that Mr. Hyde, Mr. Sterling, and Mr. Manning be appointed as a committee to nominate to the Executive Committee the aforesaid judges of Election. Adopted.

The committee reported the names of the following gentlemen for judges of election, which report was accepted and adopted, as follows: J. C. Morrill, of Jackson, Samuel La Mott, of Paw Paw, and Captain Marvin Dorrill, of Jackson.

Moved by Mr. Greene, that the superintendents of the several departments, including the superintendent of the Pomological department, be instructed to inspect their departments with a view of selecting cereals, fruit, etc., to exhibit at the Centennial at Philadelphia. Adopted.

Adjournment.

Tuesday, September 19, 1876.

Executive Committee met at the Secretary's office. Quorum present.

Adjourned to meet at 8 o'clock at the parlors of the Hibbard House, Jackson.

Met at the Hibbard House, pursuant to adjournment. Roll called, and the following gentlemen answered to their names:

President—Humphrey, Kalamazoo.

Secretary—Kimball, Pontiac.

Committeemen—Geo. W. Phillips, E. W. Rising, J. M. Sterling, C. W. Greene, Wm. M. Ferry, N. L. Avery, A. O. Hyde, C. L. Whitney, J. G. Ramsdell, A. F. Wood, J. Q. A. Burrington, F. M. Manning, W. L. Webber, Abel Angel, H. O. Hanford, J. W. Childs, R. G. Hart, and W. J. Baxter.

The President submitted a letter from committeeman J. M. French, of Detroit, tendering his resignation, which, on motion, was received and accepted.

A letter was read from Mr. Heaton in regard to a suit he had commenced against the Society to obtain damages for alleged expulsion from booth ground, rented by said Heaton at East Saginaw in 1874. On motion, the subject was indefinitely postponed.

Mr. Webber, from the Committee on Revisal of Organic Law and Constitution, reported the action of said committee as published in the premium list for 1876, which was read by the Secretary, and on motion the report was accepted, and is as follows:

To the Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN:—The committee appointed at the December meeting (1875) to draft "A Revised Act of Incorporation," to be presented to the Legislature for adoption,—also to draft a Constitution for this Society in accordance therewith,—would respectfully report that after consultation it was thought by your committee that the purposes of the resolution would be better carried out by incorporating the whole in one bill, and we report herewith a bill for the government of the Michigan State Agricultural Society, which has the unanimous approval of your committee, and which is respectfully submitted for your consideration.

Dated May 18, 1876.

WM. L. WEBBER,
C. L. WHITNEY,
WM. M. FERRY,
J. WEBSTER CHILDS,
R. G. HART,
C. F. KIMBALL.

A BILL for the government of the Michigan State Agricultural Society.

SECTION 1. *The People of the State of Michigan enact*, That the corporation created by act approved March 31, 1849, by the name of The Michigan State Agricultural Society, shall possess the powers and rights and shall be governed by the regulations prescribed in this act.

SEC. 2. The object of said Society shall continue to be the promotion of agricultural, mechanical, and kindred arts in this State, and said Society shall possess the powers and privileges, and be subject to the liabilities contained in chapter 130 of the compiled laws of 1871, so far as the same may be applicable.

SEC. 3. Said Society is authorized to take, hold, and convey, in addition to its library and its scientific and agricultural collections, real and personal property in value not exceeding one hundred thousand dollars.

SEC. 4. The said Society shall transmit an annual report to the Secretary of State on or before the 31st day of December in each year. Such report shall contain an account of the general operations of the Society and such matters of general interest to agriculturists as the Executive Committee of said Society may order to be placed therein, and shall also contain an exact statement of the receipts and disbursements of the Society for the time embraced in said report, and — copies of such report shall be printed and bound annually, under the supervision of the Secretary of State, in the same manner and form as the report of the Board of Agriculture of the State, and when completed the Secretary of State shall deposit — copies with the State Librarian, for the use of the State Library, and he shall send to the county clerks each a sufficient number of copies so that one may be placed in each township and public school library, and the remaining copies shall be sent to the Secretary of the Michigan State Agricultural Society, for the use of said Society, subject to the control of its Executive Committee.

SEC. 5. The office and library of said Society shall be at the city of Lansing, and the Board of State Auditors are authorized and required to designate suitable rooms in the capitol building for the use of said Society, provided that the rooms so designated may also be used by the Michigan State Pomological Society for like purposes. The said Society and its Executive Committee may hold their meetings at such place or places within the State as the Executive Committee shall order.

SEC. 6. The Executive Committee and officers of said Society now in office shall continue in office until the close of the year 1877. At the annual meeting and fair to be held in the month of September or October next, there shall be elected by ballot an Executive Committee of eighteen members, to be selected, two from each Congressional district in this State, one of whom from each of said districts shall hold his office for one year and one for two years, to be determined by lot at the first meeting of the Executive Committee held after January 1, 1878. The members so elected shall enter upon the performance of their duties on the first day of January, 1878, and thereafter the business and affairs of said Society shall be managed by the Executive Committee elected pursuant to the provisions of this act. Said Executive Committee shall choose by ballot from among their own number one President, one Vice President, one Secretary, and one Treasurer, who shall hold their offices as such for one year, and until their successors shall respectively be elected: *Provided*, That the Executive Committee may, on notice and hearing, remove any officer from office for misfeasance or malfeasance in office. At each annual meeting and fair after January 1st, 1878, there shall be elected by ballot nine members of the Executive Committee, each to hold his office for the term of two years, to be selected one from each Congressional District in this State: *Provided*, That should the number of Congressional Districts in this State at any time be increased or diminished, the Executive Committee shall be increased or diminished accordingly. Within ten days after any election of members of the Executive Committee, the Secretary shall give written notice to the persons so elected, and each of the persons so elected shall thereupon, within thirty days after the date of such notice, file with the Secretary a written acceptance of the office. In case of neglect or refusal to do so, the office to which he was elected shall, from the time its duties would commence, be deemed vacant.

SEC. 7. All ex-Presidents of said Society are hereby made honorary members of such Executive Committee, and may attend its meetings and have a right to speak on all matters but shall have no vote.

SEC. 8. The officers and members of said Executive Committee shall receive no compensation whatever for their services (except the Secretary and Treasurer), but all members of the Executive Committee, except honorary members, shall be entitled to have their actual necessary expenses, while engaged in the performance of their duties as such, paid from the treasury of the Society. The Secretary and Treasurer

shall be entitled to such annual salary as the Executive Committee shall from time to time fix.

SEC. 9. Should any officer or member of the Executive Committee neglect to perform his duties as such, he may, after due notice, be removed from office by a two-thirds vote of the remaining members of the Executive Committee. All vacancies in the Executive Committee, however occasioned, may be filled by appointment from the proper district, by the Executive Committee, until the next election. Should any member of the Executive Committee remove his residence outside the district for which he is chosen, such removal shall terminate his said office.

SEC. 10. The Executive Committee are authorized to make by-laws for the government of the Society and prescribing the powers and duties of the several officers, and providing for such sub-committees and assistants, with their powers and duties, as to said Executive Committee shall seem proper. Such by-laws may be altered or amended at any time by a unanimous vote of the members of the Executive Committee present at a regular meeting, but no alteration shall be made therein (except by a unanimous vote) until such alteration or amendment shall have been proposed at a meeting of the Executive Committee, been published in one or more newspapers in the State, and laid over for consideration at least sixty days after the first publication, and again submitted to a vote of the Executive Committee, when, if it shall receive a majority vote, it shall be adopted.

SEC. 11. A majority of said Executive Committee shall be a quorum for the transaction of business.

SEC. 12. The Executive Committee shall determine the place for holding each annual meeting and fair of this Society, and shall call such meeting and fair at such time in the month of September or October in each year as it may determine, giving at least sixty days' public notice thereof.

SEC. 13. The Executive Committee shall direct the money appropriations of the Society, and shall have the control of its finances and property, and may direct its investments, and shall make the necessary appropriation for the annual fair, and issue all proper public notices and circulars in relation thereto. The Executive Committee shall be bound by the provisions of this act and by the by-laws of the Society, and also by such instructions as may be given to it at the annual meeting and fair of the Society in matters not herein or in said by-laws specially provided for; and it shall be the duty of the Executive Committee to see that the annual report is prepared for the Secretary of State, as herein provided.

SEC. 14. Said Executive Committee may annually regulate and award premiums on such articles, productions, and improvements as they may deem best calculated to promote the objects of the Society.

SEC. 15. The Treasurer shall receive all moneys belonging to the Society, and keep an accurate account thereof, showing from what source received by items: and he shall pay the same out only by order of the Executive Committee, certified by the Secretary and countersigned by the President, and at the meeting of the Executive Committee next after each annual meeting and fair of the Society, he shall make a full report by items of its financial transactions and condition. He shall give bonds to the Society as security for the faithful performance of his duties in such amount and with such sureties as the Executive Committee shall prescribe and approve.

SEC. 16. The Secretary shall keep an accurate account of all moneys received by him, showing by items the source from whence received, and such moneys shall be paid over by him without abatement to the Treasurer. The Secretary shall make a report to the Society, at the meeting of the Executive Committee next after each annual meeting and fair of the Society, which report shall state by items all moneys received by him, and shall also state the dates at which the same are paid over to the Treasurer, and the amount paid at each time. Such report shall also show all warrants drawn on the Treasurer, and the specific purpose for which each warrant is drawn. The Secretary shall give a bond to the Society in such amount and with such sureties as the Executive Committee shall prescribe and approve.

SEC. 17. The bonds to be given by the Secretary and Treasurer, as provided by this act, shall by the Executive Committee be deposited with the State Treasurer, at Lansing, for safe keeping.

SEC. 18. It shall be the duty of the Executive Committee annually, or oftener, to settle with the Treasurer and the Secretary. The Treasurer shall deposit or invest the moneys of the Society in such place or manner as the Executive Committee shall order, and he shall, while such moneys are in his hands, keep the same separate from his own moneys, and the moneys of any other person or corporation. He shall not use nor permit them to be used, except in pursuance of authority given him in accordance with this act.

SEC. 19. The reports made by the Secretary and Treasurer shall be published within thirty days after the same are made, in such newspaper or newspapers as the Executive Committee may order.

SEC. 20. Any person may become a member of the Michigan State Agricultural Society for one year, by paying into the Treasury the sum of one dollar, and any person may become a life member by paying to the Treasurer the sum of ten dollars.

SEC. 21. It shall be the duty of the Secretary to prepare and keep an alphabetical record of the names of all the members of the Society, whether life or annual, and the annual report of the Society shall state the number of members at the date of each report, and such record shall be subject to the inspection of any member of the Executive Committee.

SEC. 22. It shall be the duty of the several officers and committees of the Society to deliver to their successors in office at the end of their term, on demand, all books, property, money, papers, and other things belonging to the Society. In case any one should neglect or refuse so to do, the duty imposed by this section may be enforced in the same manner as is or may be provided by law to enforce a like duty as to county officers.

SEC. 23. All laws contravening the provisions of this act are hereby repealed, and the constitution under which said Society has heretofore been acting is also repealed.

Judge Ramsdell moved that the report be adopted. After remarks from Messrs. Ramsdell, Baxter, and Webber, Mr. Sterling moved that section six of the report be amended by making the President, Secretary, and Treasurer elective by the members of the Society and not from the list composing and by the Executive Committee, which motion being seconded, Messrs. Webber, Baxter, Ferry, Ramsdell, and Childs ably discussed the subject, opposing the amendment. Mr. Baxter moved as a substitute for Mr. Sterling's motion that section six be so amended as to authorize the Executive Committee to employ a secretary, which was adopted, and the report was adopted.

Mr. Ferry offered the following resolution, which was adopted :

Resolved, That the Secretary be authorized to prepare tickets submitting to the Society the action of the Executive Committee in regard to "a revised act of incorporation of the Michigan State Agricultural Society," and the question shall be submitted to the Society in the following manner: "To memorialize the State Legislature for the revised act of incorporation in accordance with form adopted for the Executive Committee—Yes, or No."

Moved and adopted that the Secretary cause to be printed the regular tickets, and the opposition tickets should one be proposed.

On motion, the vacancy caused by the resignation of Mr. French was filled by the appointment of Col. Grover S. Wormer, of Detroit.

On motion, the vacancy caused by the resignation of Mr. Van Valkenburgh was filled by the appointment of Cyrus G. Luce, of Branch.

Adjournment.

Jackson, September 20, 1876.

Executive Committee met at the President's office.

Roll called: Quorum present.

Mr. Ramsdell tendered his resignation as a member of the Executive Committee.

On motion of Mr. Baxter, Mr. Ramsdell was requested to withdraw his resignation. In accordance therewith, the resignation was withdrawn.

Adjournment.

ANNUAL ELECTION OF OFFICERS.

We, the undersigned, having been duly appointed by the Executive Committee of the Michigan State Agricultural Society, Judges of the Election for Officers of said Society, to be held Thursday, September 21, 1876, at the speaker's stand on the fair ground in Jackson, do hereby certify that we will faithfully and impartially act as said judges of such election in accordance with the rules and regulations heretofore adopted by said Society.

(Signed.)

M. DORRILL,
THOMAS F. MOORE,
E. K. PARK.

ADOLPH WHEELER, *Clerk.*

We hereby certify that in accordance with the foregoing appointment, we have performed all the duties pertaining to the Judges of Election for officers of the Michigan State Agricultural Society, and report the result as follows:

The ballots cast were:

For President, 540, of which E. O. Humphrey had.....	526	
Wm. M. Ferry.....	14	
	<hr/>	540
For Secretary—J. P. Thompson.....	525	
A. M. Tinker.....	14	
	<hr/>	539
For Treasurer—A. J. Dean.....	540	
	<hr/>	540
For Executive Committeemen for two years—		
G. S. Wormer.....	539	elected
S. G. Ives.....	48	
J. F. Drew.....	51	
Preston Mitchell.....	48	
Orrin Snow.....	48	
Wm. M. Ferry.....	530	elected
R. E. Trowbridge.....	51	
Ralph Ely.....	48	
E. L. Tracy.....	48	
J. G. Ramsdell.....	479	elected
Geo. W. Phillips.....	492	"
E. W. Rising.....	491	"
J. M. Sterling.....	489	"
C. W. Greene.....	492	"
Henry Fralick.....	492	"
A. O. Hyde.....	492	"
D. A. Blodgett.....	476	"
C. L. Whitney.....	55	
E. W. Wiley.....	14	
D. S. Holcomb.....	15	

And we further declare that the following is the vote for and against the report of the Committee on Organic Law of the said Society:

Yeas.....	32	
Nays.....	482	
	<hr/>	514

M. DORRILL,
THOS. N. MOORE,
E. K. PARK,
Judges of Election.

A. WHEELER, *Clerk.*

Jackson, Mich., Sept. 21, 1876.

Meeting was called to order by President Humphrey.

Mr. Childs moved that the reading of the minutes of the last meeting be dispensed with.

Mr. Hanford said that one committee had failed to make a report on certain articles and part of the committee gone home. As certain exhibitors were

dissatisfied, he wished for instructions with reference to the appointment of another committee.

Mr. Rising moved that the matter be referred to the Superintendent, and if he found that the committee had not examined the articles thoroughly, he be authorized to appoint a new committee.

The motion was carried.

Mr. Rising raised the question of allowing exhibitors to remove stock on Friday, before the close of the fair.

Mr. Webber moved that superintendents be requested to hold the articles on exhibition till two o'clock on Friday afternoon.

After discussion pro and con, Mr. Webber changed the hour from two to three o'clock, in which form his motion was carried.

Adjourned.

September 22, 1876.

The Executive Committee were called to order by the President.

Roll called: quorum present.

Reading of minutes dispensed with.

A bill for goods contracted, of Brown & Pilcher, by the Society in 1869, which was ordered paid, amounting to \$20.40.

A communication was received from Mrs. Jennie Burtt, in relation to entry No. 24, Class 14, Div. B., alleging that her entry was not examined by the awarding committee and asking relief. The communication was referred to Superintendent Howard.

A protest was received from Perry Averill against the award in Div. K., Class 50, class of "crayon pictures of face," which was ordered referred to Superintendent Shoemaker.

Protest was received from C. D. Andrews against the teams of Mr Hewitt and Dr. Collins, in "gents' driving class." Referred to Superintendent Hyde.

A protest was received from Arthur Wood, of Grand Rapids, against the award on "market wagons." The communication was referred to the Secretary, with instructions that if the judgment of the committee was as between two vehicles as entered to carry out the award of the committee.

Application being made for Mr. Gale, that his exhibition has been entirely overlooked without his being at fault, on motion Messrs. Humphrey, Sterling, and Kimball were appointed a committee in the matter of double awards in the same class, subdivision.

On motion the Secretary was ordered to pay but one first and one second premium to the same party in the same subdivision.

A silver medal to G. S. Wormer & Sons, awarded in 1874 for best show of machinery, was ordered delivered.

Adjourned.

C. F. KIMBALL, *Secretary.*

OFFICIAL LIST OF PREMIUMS AWARDED BY THE MICHIGAN STATE
AGRICULTURAL SOCIETY, AT THE 28TH ANNUAL FAIR, HELD
AT JACKSON SEPTEMBER 18TH TO 27TH, 1876.

DIVISION A.

CLASS 1.—SHORTHORNS.

Bulls.

Bull four years old or over—Sth Earl of Lakeview 14166, E. L. Smith, Kalamazoo, 1st premium.....	\$30 00
Royal Hotspur, Ezra Mead, Grand Blanc, 2d premium.....	20 00
Eleventh Duke of Hillsdale, A. S. Brooks, West Novi, 3d premium.....	10 00
Three years old—G. W. and H. T. Phelps, Dexter, 1st premium.....	20 00
Uhl's Duke, David M. Uhl, Ypsilanti, 2d premium.....	12 00
Sixteenth Duke of Hillsdale, Clark & Gilman, Pulaski, 3d premium.....	8 00
Two years old—Belmont 5th, Amos F. Wood, Mason, 1st premium.....	15 00
Wm. Somerville, Holt, 2d premium.....	10 00
S. E. Cooper, Francisco, 3d premium.....	5 00
One year old—Frank Dwelle, Grass Lake, 1st premium.....	10 00
1st Duke of Brookside, Thomas Shaw, Mundy, 2d premium.....	5 00
D. McOmber, Hastings, 3d premium.....	3 00
Bull calf—G. W. & H. T. Phelps, Dexter, 1st premium.....	7 00
Tilden (7 months old), David M. Uhl, Ypsilanti, 2d premium.....	5 00
S. D. Cooper, Francisco, 3d premium.....	3 00
Bull of any age—G. W. & H. T. Phelps, Dexter, 1st premium.....	Diploma

Cows.

Four years old or over—G. W. & H. T. Phelps, Dexter, 1st premium.....	\$30 00
D. S. Holcomb, Jackson, 2d premium.....	20 00
G. W. & H. T. Phelps, Dexter, 3d premium.....	10 00
Heifers three years old—G. W. & H. T. Phelps, Dexter, 1st premium.....	20 00
Bonnie Lass 2d, A. S. Brooks, Novi, 2d premium.....	12 00
John Lessiter, Jersey, 3d premium.....	8 00
Heifers two years old—S. E. Cooper, Francisco, 1st premium.....	15 00
G. W. & H. T. Phelps, Dexter, 2d premium.....	10 00
A. S. Brooks, West Novi, 3d premium.....	5 00
Yearling heifer—G. W. & H. T. Phelps, Dexter, 1st premium.....	10 00
Miss Oxford, David Uhl, Ypsilanti, 2d premium.....	5 00
John Lessiter, Jersey, 3d premium.....	3 00
Heifer calf—G. W. & H. T. Phelps, Dexter, 1st premium.....	7 00
Thomas Shaw, Mundy, 2d premium.....	5 00
W. A. Holcomb, Francisco, 3d premium.....	3 00

I. H. BUTTERFIELD, JR.,
JOHN MILLER,
M. W. DUNHAM,

Committee.

CLASS 2.—DEVONS.

Bulls.

Four years old or over—Batavia, R. G. Hart, Lapeer, 1st premium.....	\$30 00
Seven years old—Victor, E. T. Doney, Jackson, 2d premium.....	20 00
Frank Tompkins, Girard, 3d premium.....	10 00
Three years old—R. G. Hart, Lapeer, 1st premium.....	20 00
Bull calf—R. G. Hart, Lapeer, 1st premium.....	7 00

Cows.

Four years old or over—Bessie, R. G. Hart, Lapeer, 1st premium.....	\$30 00
Lady Elgin, 2d, 2d premium.....	20 00
Cherry of Lapeer 2d, R. G. Hart, Lapeer, 3d premium.....	10 00

Heifer three years old—Lilly, R. G. Hart, Lapeer, 1st premium.....	\$20 00
Frank Tompkins, Girard, 2d premium.....	12 00
Heifer two years old—Laura, R. G. Hart, Lapeer, 1st premium.....	15 00
Rosetta, R. G. Hart, Lapeer, 2d premium.....	10 00
Frank Tompkins, Girard, 3d premium.....	5 00
Heifer one year old—Josephine 5th, R. G. Hart, Lapeer, 1st premium.....	10 00
Nettie 3d, R. G. Hart, Lapeer, 2d premium.....	5 00
Nettie 4th, R. G. Hart, Lapeer, 3d premium.....	3 00
Heifer calf—Josie, R. G. Hart, Lapeer, 1st premium.....	7 00
Maggie, R. G. Hart, Lapeer, 2d premium.....	5 00
Lilly 6th, Frank Tompkins, Girard, 3d premium.....	3 00

JOHN LESSITER,
M. L. GARD,
R. G. BAIRD,
WALTER WHITFIELD,
IRA H. BUTTERFIELD, JR.,
Committee.

CLASS 3.—HEREFORDS.

Bulls.

Three years old—Sir Arthur 2d, Thomas Clark, Elyria, Ohio, 1st premium...	\$20 00
One year old—Success 2d, Thomas Clark, Elyria, 1st premium.....	10 00
Calf—Ridgeville Boy, Thomas Clark, Elyria, 1st premium.....	7 00

Cows.

Four years old or over—Primrose 2d, Thomas Clark, Elyria, 1st premium....	\$30 00
Princess Louisa, Thomas Clark, Elyria, 2d premium.....	20 00
Heifer two years old—Sunflower 1st premium.....	15 00
Nellie 2d, 2d premium.....	10 00
Heifer calf—Lilly May, Thomas Clark, Elyria, 1st premium.....	7 00
Maggie, Thomas Clark, Elyria, 2d premium.....	5 00

Bull of any age—Success 2d, Thomas Clark, Elyria, 1st premium.....Diploma

JOHN LESSITER,
Chairman Committee.

CLASS 4.—AYRSHIRES.

Bulls.

Four years old or over—Lorraine, A. G. Wilson, Laporte, Ohio 1st premium...	\$30 00
W. W. Tracy, Old Mission, 2d premium.....	20 00
Two years old—Rarnah, A. J. Wilson, Laporte, 1st premium.....	8 00
One year old—Lorraine Jr., A. J. Wilson, Laporte, 1st premium.....	8 00
Horace, A. J. Wilson, Laporte, 2d premium.....	4 00

Cows.

Four years old—Susan 3d, A. J. Wilson, Laporte, 1st premium.....	\$30 00
Nonsuch, A. J. Wilson, Laporte, 2d premium.....	20 00
Three years old—Kittie Muir 2d, A. J. Wilson, Laporte, 1st prem.....	20 00
Heifer three years old—Annie, A. J. Wilson, Laporte, 1st premium.....	10 00
Heifer one year old—Snowdrop, A. J. Wilson, Laporte, 1st premium.....	8 00
Rosie 2d, A. J. Wilson, Laporte, 2d premium.....	4 00
Heifer calf—Dairyman's Favorite, A. J. Wilson, Laporte, 1st premium.....	4 00

Bull of any age—Lorraine, A. J. Wilson, Laparte, 1st premium.....Diploma

JOHN LESSITER,
Chairman Committee.

CLASS 5.—ALDERNEYS.

Bulls.

Four years old or over—Jeff Smith, Parma, 1st premium.....	\$30 00
Monker, O. E. Clark, Traverse City, 2d premium.....	20 00
Three years old—Duke of Jersey 1166, Millard L. Frisk, Oxford, 1st premium.....	20 00
Bull calf 47 days old—Millard L. Frisk, Oxford, 1st premium.....	4 00
Jeff Smith, Parma, 2d premium.....	2 00

Cows.

Heifer one year old—Kitty Gray 1963, Millard L. Frisk, Oxford, 1st premium.	\$8 00
JOHN LESSITER, <i>Chairman Committee.</i>	

CLASS 6.—GALLOWAYS.

Bulls.

Four years old—Shoo Fly, R. G. Hart, Lapeer, 1st premium.	\$30 00
Henry Grinnell, West Bloomfield, 2d premium.	20 00
Three years old—Buffalo Bill, R. G. Hart, Lapeer, 1st premium.	20 00
One year old—Old Pod, R. G. Hart, Lapeer, 1st premium.	8 00

Cows.

Four years old—Topsy, R. G. Hart, Lapeer, 1st premium.	\$30 00
Dairy Maid, R. G. Hart, Lapeer, 2d premium.	20 00
Three years old—Victoria, R. G. Hart Lapeer, 1st premium.	20 00
Dora 2d, R. G. Hart, Lapeer, 2d premium.	10 00
Heifer two years old—Black Rachael, R. G. Hart, Lapeer, 1st premium.	10 00
May Queen, Henry Grinnell, West Bloomfield, 2d premium.	7 00
Heifer calf—Henry Grinnell, West Bloomfield, 2d premium.	4 00
Dolly Varden, R. G. Hart, Lapeer, 2d premium.	2 00
Heifer calf one year old—Mollie Darling, R. G. Hart, Lapeer, 1st premium.	8 00
Henry Grinnell, West Bloomfield, 2d premium.	4 00

JOHN LESSITER,
Chairman Committee.

CLASS 7.—NATIVE CATTLE.

Cows.

Four years or over—David Miller, Clarkston, 1st premium.	\$20 00
David N. Miller, Clarkston, 2d premium.	10 00
N. A. Clapp, Wixom, 3d premium.	5 00
Heifer three years old—David Miller, Clarkston, 1st premium.	15 00
David Miller, Clarkston, 2d premium.	7 00
J. L. Harris, Marshall, 3d premium.	4 00
Heifer two years old—David Miller, Clarkston, 1st premium.	10 00
David Miller, Clarkston, 2d premium.	5 00
E. T. Doney, Jackson, 3d premium.	Discretionary
Yearling heifer—D. R. McElwain, Hastings, 1st premium.	\$8 00
David Miller, Clarkston, 2d premium.	5 00
Durham, D. Merriman, Jackson, 3d premium.	Discretionary
Heifer calf—David Miller, Clarkston, 1st premium.	\$5 00
Maynard Sharp, Jackson, 2d premium.	3 00

W. H. ARNOLD,
W. WHITFIELD,
MILTON S. GARD,
MORGAN CASE.

Committee.

CLASS 8.—WORKING OXEN AND STEERS.

Yoke of working oxen 5 years or over—Horace Darling, Arland, Jackson, 1st premium.	\$25 00
C. C. Pond, Jackson, 2d premium.	20 00
Yoke of steers 4 years old—David Miller, Clarkston, 1st premium.	15 00
Yoke steers 3 years old—Amos F. Wood, Mason, 1st premium.	10 00
Warren Thorpe, Jackson, 2d premium.	7 00
S. Peckham, Jackson, 3d premium.	5 00
Yoke of steers 4 years old—John Robson, Jackson, 1st premium.	8 00
E. T. Doney, Jackson, 2d premium.	5 00
Yoke of steers 1 year old—Amos F. Wood, Mason, 1st premium.	5 00
R. D. Jackson, 2d premium.	3 00

HENRY MCKAY,
W. H. ARNOLD,
ED. MCGUNAGLE,
W. WHITFIELD,
MILTON J. GARD,
MORGAN CASE,

Committee.

CLASS 9.—FAT CATTLE.

Herd of fat cattle 4 in number—E. A. Bissell, Richland, 1st premium.....	\$75 00
John Lessiter, Jersey, 2d premium.....	50 00
Pair fat oxen—John Powers, Homer, 1st premium.....	30 00
Fat cow—R. G. Hart, Lapeer, 1st premium.....	15 00
John Lessiter, Jersey, 2d premium.....	10 00
Heifer 3 years old—E. A. Bissell, Richland 1st premium.....	10 00
Steer 3 years old—E. A. Bissell, Richland, 1st premium.....	10 00
E. A. Bissell, Richland, 2d premium.....	5 00
Amos F. Wood, Mason, 3d premium.....	Discretionary

WM. SMITH, JR.,
WALTER WHITFIELD,
ISAAC RUNYAN,

Committee.

CLASS 10.—HERDS AND SWEEPSTAKES.

Herd of Herefords—Thomas Clark, Elyria, 1st premium.....	\$75 00
Herd of Shorthorns—G. W. & H. T. Phelps, Dexter, 2d premium.....	50 00
Herd of Shorthorns—A. S. Brooks, West Novi, 3d premium.....	25 00

I. H. BUTTERFIELD, JR.,
W. G. BECKWITH,
JOHN MILLER,
JAMES TAYLOR,
R. F. JOHNSTONE,

Committee.

DIVISION B.—HORSES.

CLASS 11.—THOROUGHBREDS.

Stallions.

Four years old or over—St. Dennis, George S. Hodges, Kalamazoo, Mich., 1st premium.....	\$30 00
N. J. Custer, Monroe, Mich., 2d premium.....	20 00
Albert Draper, Foster & Nye, Flint, Mich., 3d premium.....	10 00

Mares.

Four years old or over, without colt—Dupin, Dan. B. Hibbard, Jackson, Mich., 1st premium.....	\$15 00
Victorine, A. Van Slyke, Flint, 2d premium.....	12 00

MYRON COLE,
L. B. WAKEFIELD,
W. G. BECKWITH,

Committee.

CLASS 12.—HORSES OF ALL WORK.

Stallions.

Five years old or over—S. L. Loud, Jackson, Mich., 1st premium.....	\$30 00
Joe Barker, A. H. Cutter, Parma, 2d premium.....	20 00
Chas. E. Stewart, Jackson, 3d premium.....	10 00
Four years old—Napoleon 3d, M. W. Dunham, Wayne, Ill., 1st premium.....	25 00
King Kerod, A. T. Ingalls, Leslie, 2d premium.....	15 00
Lexington Chief, John Purdy, Leonidas, 3d premium.....	10 00
Three years old—James Bonine, Vandalia, 1st premium.....	20 00
J. N. Herrick, Grass Lake, 2d premium.....	15 00
A. T. Ingalls, Leslie, 3d premium.....	10 00
Two years old—H. Haines, Tompkins Center, 1st premium.....	12 00
M. Booth, Brooklyn, 2d premium.....	8 00

Mares.

Brood mare four years old or over, foal by side—C. Cassidy, Grass Lake, 1st premium.....	\$20 00
David Stiles, Ceresco, 2d premium.....	15 00
John McNett, Bronson, 3d premium.....	10 00

Four years old or over, without colt—C. N. Hungerford, Concord, 1st premium,	\$12 00
Three years old—C. Harris, Hudson, 1st premium.....	12 00
C. A. Brown, Norvell, 2d premium.....	8 00
Filly two years old—Fred. Carlisle, Pontiac, 1st premium.....	10 00
Chas. Cassidy, Grass Lake, 2d premium.....	6 00
Filly one year old—Chas. Cassidy, Grass Lake, 1st premium.....	7 00
E. H. Hall, Bath, 2d premium.....	5 00
Gelding four years old—John Powers, Homer, 1st premium.....	12 00
Milton Draper, Jackson, 2d premium.....	8 00
A. Draper, Jackson, 3d premium.....	5 00
Pair matched horses of all work five years old or over—Lewis Gillespie, Jackson, 1st premium.....	30 00
Benj. Miller, South Riley, 2d premium.....	20 00
Pair matched horses of all work four years old—Chas. E. Stewart, Jackson, 1st premium.....	25 00
Stallion colt—Lambkin & Ferguson, Brockway, 1st premium.....	7 00
David Stiles, Ceresco, 2d premium.....	5 00
M. W. Dunham, Wayne, Ill., 3d premium.....	3 00
Filly—John McNett, Bronson, 1st premium.....	5 00

M. COLE,
W. G. BECKWITH,
S. B. WAKEFIELD,

Committee.

CLASS 13.—ROADSTERS AND BREEDING STOCK.

Stallion five years old or over—Mambrino Gift, Nye & Foster, Flint, 1st premium.....	\$30 00
Hamlet, A. H. Cutler, Parma, 2d premium.....	20 00
Don J. Robinson, Dan. B. Hibbard, Jackson, 3d premium.....	10 00
Stallion four years old—Mambrino Fisk, Nye & Foster, Flint, 1st premium.....	25 00
Marker, Frank L. Skeels & Co., Coldwater, 2d premium.....	15 00
Wm. H. Hood, Ionia, 3d premium.....	10 00
Gelding five years old—R. G. Hart, Lapeer, 1st premium.....	15 00
Chas. Cobb, Kalamazoo, 2d premium.....	10 00
Frank Ray, Concord, 3d premium.....	5 00
Stallion three years old—M. Shoemaker, Jackson, 1st premium.....	20 00
Stallion two years old—Richelieu, L. C. Rowan, Jackson, 1st premium.....	12 00
Phil, Lewis Gillespie, Jackson, 2d premium.....	8 00
Tekonsha, J. C. Blake, Tecumseh, 3d premium.....	5 00
Yearling stallion—David Stiles, Ceresco, 1st premium.....	10 00
Tipsico, Nye & Foster, Flint, 2d premium.....	6 00
Mambrino Charley, C. N. Hungerford, Concord, 3d premium.....	4 00
Stallion colt—Gov. Crapo, Nye & Foster, Flint, 1st premium.....	7 00
Landseer, Nye & Foster, Flint, 2d premium.....	5 00
Four months old—C. P. Russell, Jackson, 3d premium.....	3 00
Brood mare four years old or over, foal by side—Kittie Bates, Dan. B. Hibbard, 1st premium.....	20 00
Minerva, Nye & Foster, Flint, 2d premium.....	15 00
Mare four years old, without colt—Hurd & Chamberlain, Jackson, 1st premium,	12 00
R. W. Becker, Lansing, 2d premium.....	8 00
M. E. & J. D. McKercher, Hanover, 3d premium.....	5 00
Mare three years old—Frank L. Skeels, Coldwater, 1st premium.....	10 00
Mare two years old—Mambrino Belle, Nye & Foster, Flint, 1st premium.....	8 00
Babe, Nye & Foster, 2d premium.....	5 00
Hurd & Chamberlain, Jackson, 3d premium.....	3 00
Mare one year old—David Stiles, Ceresco, 1st premium.....	8 00
M. E. & J. D. McKercher, Hanover, 2d premium.....	5 00
M. E. & J. D. McKercher, 3d premium.....	2 00

GEO. SHERWOOD,
J. T. DOWNS,
C. N. HUNGERFORD,

Committee.

CLASS 14.—DRIVING HORSES.

Pair driving horses—D. Merriman, Jackson, 1st premium.....	\$50 00
J. W. Hewitt & Son, Jackson, 2d premium.....	30 00
Collins & Howell, Hanover, 3d premium.....	20 00
C. D. Andrews, Hillsdale, 4th premium.....	10 00

Single gelding or mare five years old or over—S. S. Cobb, Kalamazoo, 1st premium.....	\$30 00
Single mare four years old—Willard Weeks, Leslie, 1st premium.....	20 00
Kitty, A. C. Fisk, Coldwater, 2d premium.....	15 00
Single gelding four years old—A. L. Vandercook, Mason, 3d premium.....	10 00
John Button, Coldwater, 4th premium.....	5 00
Single gelding or mare five years old or over—Floyd Deyo, Jackson, 1st premium.....	20 00
Frank L. Skeels & Co., Coldwater, 2d premium.....	10 00
Morris Knapp, Jackson, 3d premium.....	5 00

CLASS 15.—DRAUGHT HORSES.

Stallion four years old or over—Elisha Lambkin, Brockway, 1st premium.....	\$30 00
Young Netherby, William Cox, Greenfield, 2d premium.....	20 00
S. A. Barnes, Charlotte, 3d premium.....	10 00
Stallion three years old—Mora, Bangs, Billsborrow & Co., Paw Paw, 1st premium.....	25 00
Heart of Oak, Lorenzo G. Pierson, Livonia, 2d premium.....	15 00
Young British Champion, Ralph Fields, Owosso, 3d premium.....	10 00
Stallion two years old—Auvergne, M. W. Dunham, Wayne, Ill., 1st premium.....	20 00
J. O. Johnson, Bronson, 2d premium.....	12 00
Draft mare four years old or over—Mignette, M. W. Dunham, Wayne, Ill., 1st premium.....	30 00
Viola, M. W. Dunham, 2d premium.....	20 00
Adelaide, M. W. Dunham, 3d premium.....	10 00
Imported draft stallion four years old—Apollo, M. W. Dunham, 1st premium.....	50 00
Glenifer, Robert W. Elston, Muskegon, 2d premium.....	30 00
Jean Burt, M. W. Dunham, Wayne, Du Page Co., Ill., 3d premium.....	20 00
Mare three years old—Eugenie, Bangs Billsborrow & Co., Paw Paw, 1st premium.....	12 00
Mare two years old—A. F. McKee, Watervliet, 1st premium.....	10 00
Mare colt—Eveline, M. W. Dunham, Wayne, Ill., 1st premium.....	6 00
Zenobie, M. W. Dunham, 2d premium.....	4 00
Stallion colt—Artois, M. W. Dunham, 1st premium.....	6 00
Blank, M. W. Dunham, 2d premium.....	4 00

M. COLE,
F. W. DICKEY,
WM. CONLEY,

Committee.

SPECIAL AWARDS TO THOROUGHbred IMPORTED DRAFT STOCK.

Span draft horses—M. W. Dunham, Wayne, Ill., 1st premium.....	\$30 00
W. W. Dunham, 2d premium.....	20 00
Shaw & Carpenter, Jackson, 3d premium.....	10 00

At a meeting of the Executive Committee, held on the fair grounds, Jackson, Sept. 22, 1876, on motion it was voted that a special award of \$50 be paid to M. W. Dunham, of Wayne, Du Page Co., Ill., for his splendid display of thoroughbred imported draft stock.

GEO. SHERWOOD.
C. N. HUNGERFORD.
J. T. DOWNS,

Committee.

CLASS 16.—MATCHED CARRIAGE HORSES.

Pair matched carriage horses sixteen hands or over four years old—J. K. Far- rand, Colon, 1st premium.....	\$30 00
W. H. Wilt, Marshall, 2d premium.....	20 00
John Weeks, Jackson, 3d premium.....	10 00
Under sixteen hands—D. W. Rikerd, Lansing, 1st premium.....	30 00
R. A. Smith, Howell, 2d premium.....	20 00
Chas. E. Stewart, Jackson, 3d premium.....	10 00
Pair matched carriage korses three years old—Lewis Hasbrook, Leslie, 1st pre- mium.....	20 00

Single carriage horse four years or over—Black Rock, Chas. E. Stewart, Jackson, 1st premium.....	\$12 00
L. C. Rowan, Jackson, 2d premium.....	8 00
R. A. Smith, Howell, 3d premium.....	4 00
Single carriage horse three years old—Patchen, A. C. Fisk, Coldwater, 1st premium.....	10 00

GEO. SHERWOOD,
C. N. HUNGERFORD,
J. DOWNS,
Committee.

CLASS 17.—SADDLE HORSES.

Saddle horse—C. L. Soper, Flint, 1st premium.....	\$15 00
David Schuyler—Jackson, 2d premium.....	10 00
Romp, Chas. E. Stewart, Jackson, 3d premium.....	5 00

FRANK RAY,
JOHN ROBINSON,
N. H. TUCKER,
Committee.

CLASS 18.—ROADSTER STALLIONS.

Roadster stallion five years old—A. P. West, Union City, 1st premium.....	\$125 00
A. C. Roosa, Jackson, North Hawk, 2d premium.....	100 00
Obediah Crane, Mason, 3d.....	75 00
Four years old—Lewis Pike, Jackson, 1st premium.....	100 00
H. R. Baker, Jonesville, 2d premium.....	75 00
Peter Standish, Leslie, 3d premium.....	50 00
Three years old—G. W. Hatch, Horton, 1st premium.....	75 00
Western Star, Chas. E. Stewart, Jackson, 2d premium.....	50 00
A. J. Bennett, Mason, 3d premium.....	25 00

Mares and Geldings.

Gelding five years old—Geo. Randall, Chas. Micklissen, Jackson, 1st premium.....	\$125 00
Mare five years old—J. Cornell, Kalamazoo, 2d premium.....	100 00
G. W. Hatch, Horton, 3d premium.....	75 00
Gelding four years old—McAllister, Niles, 1st premium.....	100 00
John Foster, Hudson, 2d premium.....	75 00
A. C. Fisk, Coldwater, Frank A. Fisk, 3d premium.....	50 00
Gelding three years old—A. C. Fisk, Coldwater, 1st premium.....	75 00
M. Knapp, Jackson, 2d premium.....	50 00
A. J. Darby, Jackson, 3d premium.....	25 00
Thoroughbred stallion, any age—Rook Miranda, Ralph Fields, Owosso, 1st premium.....	100 00
Bangweola, John M. Matheson, Lowell, 2d premium.....	75 00
Thoroughbred gelding four years—Abdallah Dorsey, S. S. Vaughn, Jackson, 1st premium.....	100 00
Mare five years—Florine, John M. Matheson, Lowell, 2d premium.....	75 00
Gelding—Tom Hall, Geo. Rowan, Jackson, 3d premium.....	50 00
Thoroughbred stallion three years old—Clifton, John M. Matheson, Lowell, 1st premium.....	100 00

C. N. HUNGERFORD,
GEO. SHERWOOD,
J. T. DOWNS,
Committee.

CLASS 19.—MULES AND JACKS.

Spanish or maltese jack—Geo. Gibson, Wayne, 1st premium.....	\$20 00
Wm. D. Johnson, Grass Lake, 2d premium.....	10 00
Pair aged mules—Geo. Gibson, Wayne, 1st premium.....	10 00
A. P. Cook, Brooklyn, 2d premium.....	5 00

G. F. STARKWEATHER,
E. A. DOLPH,
A. WING,
Committee.

DIVISION C.—SHEEP AND SWINE.

CLASS 19.—AMERICAN MERINOS.

Buck two years or over—J. S., A. A. & T. C. Wood, Saline, 1st premium.....	\$15 00
J. S., A. A. & T. C. Wood, Saline, 2d premium.....	10 00
I. M. Whitaker, Lima, 3d premium.....	5 00
R. D. M. Edwards, Horton, award of committee.....	12 00
Buck one year old—J. S., A. A. & T. C. Wood, Saline, 1st premium.....	12 00
J. S., A. A. & T. C. Wood, Saline, 2d premium.....	8 00
J. S., A. A. & T. C. Wood, Saline, 3d premium.....	4 00
Three buck lambs—J. S., A. A. & T. C. Wood, Saline, 1st premium.....	10 00
J. S., A. A. & T. C. Wood, Saline, 2d premium.....	5 00
Three ewes two years old or over—J. S., A. A. & T. C. Wood, Saline, 1st premium.....	15 00
I. M. Whittaker, Lima, 2d premium.....	10 00
J. S., A. A. & T. C. Wood, Saline, 3d premium.....	5 00
Three ewes one year old—J. S., A. A. & T. C. Wood, Saline, 1st premium.....	12 00
J. S., A. A. & T. C. Wood, Saline, 2d premium.....	8 00
I. M. Whittaker, Lima, 3d premium.....	4 00
Three ewe lambs—J. S., A. A. & T. C. Wood, Saline, 1st premium.....	10 00

W. HUFF,
C. A. MILLER,
W. C. KENNEDY,
Committee.

CLASS 20.—SOUTHDOWN AND OTHER MIDDLE-WOOLED SHEEP.

Buck two years old—Wm. Newton, Pontiac, 1st premium.....	\$15 00
Fred Carlisle, Pontiac, 2d premium.....	10 00
Wm. Newton, Pontiac, 3d premium.....	5 00
Yearling buck—Fred Carlisle, Pontiac, 1st premium.....	12 00
Wm. Newton, Pontiac, 2d premium.....	8 00
Wm. Newton, Pontiac, 3d premium.....	4 00
Pen buck lambs—Wm. Newton, Pontiac, 1st premium.....	10 00
Wm. Newton, Pontiac, 2d premium.....	5 00
Fred Carlisle, Pontiac, 3d premium.....	3 00
Three ewes two years old—Fred Carlisle, Pontiac, 1st premium.....	15 00
Wm. Newton, Pontiac, 2d premium.....	10 00
Fred Carlisle, Pontiac, 3d premium.....	5 00
Three ewes one year old—Wm. Newton, Pontiac, 1st premium.....	12 00
Fred Carlisle, Pontiac, 2d premium.....	8 00
Fred Carlisle, Pontiac, 3d premium.....	4 00
Three ewe lambs—Wm. Newton, Pontiac, 1st premium.....	10 00
Fred Carlisle, Pontiac, 2d premium.....	5 00
Fred Carlisle, Pontiac, 3d premium.....	3 00

A. K. SUTTON,
W. WHITFIELD,
E. MCGUNNAGLE,
Committee.

COTSWOLD, LEICESTER, AND OTHER LONG-WOOLED SHEEP.

Buck two years old or over—Wm. Newton, Pontiac, 1st premium.....	\$15 00
Frank Wilson, Jackson, 2d premium.....	10 00
Thos. Moore, Ypsilanti, 3d premium.....	5 00
Yearling buck—Frank Wilson, Jackson, 1st premium.....	12 00
Amos F. Wood, Mason, 2d premium.....	8 00
Wm. Newton, Pontiac, 3d premium.....	4 00
Pen three buck lambs—Wm. Newton, Pontiac, 1st premium.....	10 00
Thos. A. Moore, Ypsilanti, 2d premium.....	5 00
Frank Wilson, Jackson, 3d premium.....	3 00
Three ewes two years old—Wm. Newton, Pontiac, 1st premium.....	15 00
Amos F. Wood, Mason, 2d premium.....	10 00
Thos. A. Moore, Ypsilanti, 3d premium.....	5 00
Three ewes one year old—Amos F. Wood, Mason, 1st premium.....	12 00
Wm. Newton, Pontiac, 2d premium.....	8 00
Wm. Newton, Pontiac, 3d premium.....	4 00

Three ewe lambs—Wm. Newton, Pontiac, 1st premium.....	\$10 00
Amos F. Wood, Mason, 2d premium.....	5 00
Hugh McDonald, Horton, 3d premium.....	3 00

T. H. LYON,
PETER HAGLE,
Committee.

CLASS 22.—FAT SHEEP.

Pen middle-wooled fat sheep—Wm. Newton, Pontiac, 1st premium.....	\$8 00
Fred Carlisle, Pontiac, 2d premium.....	5 00
Wm. Newton, Pontiac, 3d premium.....	3 00
Pen long-wooled sheep—Wm. Newton, Pontiac, 1st premium.....	8 00
Amos F. Wood, Mason, 2d premium.....	5 00
Wm. Newton, Pontiac, 3d premium.....	3 00

T. H. LYON,
PETER HAGLE,
Committee.

CLASS 23.—SWINE.

Berkshire boar, two years old or over—P. H. Hagle, Berville, 1st premium...	\$12 00
Wm. Gunn, Jackson, 2d premium.....	8 00
Ed. Driggs, Palmyra, 3d premium.....	4 00
Berkshire boar one year old—N. A. Clapp, Wixom, 1st premium.....	10 00
Wm. Gunn, Jackson, 2d premium.....	6 00
Wm. Gunn, Jackson, 3d premium.....	3 00
Berkshire sow two years old or over—Wm. Gunn, Jackson, 1st premium.....	12 00
Ed. Driggs, Palmyra, 2d premium.....	8 00
Berkshire sow one year old—Hall Bros., Ann Arbor, 1st premium.....	10 00
Hall Bros., Ann Arbor, 2d premium.....	6 00
Pen Berkshire pigs, not less than four in number nor over ten months old—	
C. N. Hungerford, Concord, 1st premium.....	10 00
P. H. Hagle, Berville, 2d premium.....	6 00
H. B. Jones, Dexter, 3d premium.....	3 00
Essex boar two years old—Frank Wilson, Jackson, 1st premium.....	12 00
E. T. Doney, Jackson, 2d premium.....	8 00
Amos F. Wood, Mason, 3d premium.....	4 00
Essex boar one year old—Frank Wilson, Jackson, 1st premium.....	10 00
Amos F. Wood, Mason, 2d premium.....	6 00
W. A. Holcomb, Francisco, 3d premium.....	3 00
Essex sow two years old or over—E. T. Doney, Jackson, 1st premium.....	12 00
Frank Wilson, Jackson, 2d premium.....	8 00
C. C. Pond, Jackson, 3d premium.....	4 00
Essex sow one year old—Amos F. Wood, Mason, 1st premium.....	10 00
Frank Wilson, Jackson, 2d premium.....	6 00
E. T. Doney, Jackson, 3d premium.....	3 00
Suffolk boar two years old or over—Frank Wilson, Jackson, 1st premium.....	12 00
R. G. Hart, Lapeer, 2d premium.....	8 00
R. Goodwin, Chelsea, 3d premium.....	4 00
Suffolk boar one year old—Hall Bros., Ann Arbor, 1st premium.....	10 00
Wm. Watts, Unadilla, 2d premium.....	6 00
Suffolk sow two years old or over—Hall Bros., Ann Arbor, 1st premium.....	12 00
Hall Bros., Ann Arbor, 2d premium.....	8 00
Suffolk sow one year old—Wm. Watts, Unadilla, 1st premium.....	10 00
Frank Wilson, Jackson, 2d premium.....	6 00
Hall Bros., Ann Arbor, 3d premium.....	3 00
Pen Suffolk pigs, not less than four in number nor over ten months old—H. B.	
Jones, Dexter, 1st premium.....	10 00
Wm. Watts, Unadilla, 2d premium.....	6 00
Wm. Watts, Unadilla, 3d premium.....	3 00
Fat hog over one year old—E. T. Doney, Jackson, 1st premium.....	10 00
E. T. Doney, Jackson, 2d premium.....	6 00
Fat pig less than ten months old—J. E. Woodruff, Jackson, 1st premium.....	6 00
E. T. Doney, Jackson, 2d premium.....	4 00
E. T. Doney, Jackson, 3d premium.....	2 00

JOHN LESSITER,
E. MCGUNNAGLE,
DAVID STILES,
Committee.

Poland-China and other Large Breeds.

Poland-China boar two years old or over—David Stiles, Ceresco, 2d premium.	\$8 00
Poland-China boar one year old—Boyd Bros., Sylvan Center, 1st premium.	10 00
“Rob Roy,” C. W. Jones, Richland, 2d premium.	6 00
Boyd Bros., Sylvan Center, 3d premium.	3 00
Poland-China sow two years old or over—“Lady Grier,” C. W. Jones, Richland, 1st premium.	12 00
F. A. Mills, Jackson, 3d premium.	4 00
Poland-China sow one year old—“Lilly,” C. W. Jones, Richland, 1st premium.	10 00
Hall Bros., Ann Arbor, 2d premium.	6 00
Wm. H. Palmer, Napoleon, 3d premium.	3 00
Poland-China sow six months old—C. W. Jones, Richland, 1st premium.	10 00
Pen Poland-China pigs, four in number—Boyd Bros., Sylvan Center, 2d premium.	6 00
Hall Bros., Ann Arbor, 3d premium.	3 00
Pen Essex pigs—Amos F. Wood, Mason, 1st premium.	10 00
Frank Wilson, Jackson, 2d premium.	6 00
J. D. Pierce, Jackson, 3d premium.	3 00

JOHN LESSITER,
WALTER WHITFIELD, Jr.,
THOMAS WOLVERTON.

Committee.

DIVISION D—POULTRY.

CLASS 24.

Most varied and valuable collection entered and owned by one exhibitor—W. K. Barber, Hastings, 1st premium.	\$15 00
Hayes & McElvain, Hastings, 2d premium.	10 00
Trio light Brahma fowls—Hayes & McElvain, Hastings, 1st premium.	2 00
Amos F. Wood, Mason, 2d premium.	1 00
Trio light Brahma chickens—Hayes & McElvain, Hastings, 1st premium.	2 00
H. H. Luntz, Adrian, 2d premium.	1 00
Trio dark Brahma fowls—Hayes & McElvain, Hastings, 1st premium.	2 00
W. K. Barber, Hastings, 2d premium.	1 00
Trio dark Brahma chickens—W. K. Barber, Hastings, 1st premium.	2 00
W. K. Barber, Hastings, 2d premium.	1 00
Trio buff Cochin fowls—J. B. Suylandt, Jackson, 1st premium.	2 00
W. M. Palmer, Jackson, 2d premium.	1 00
Trio buff Cochin chickens—Oscar Doolittle, Adrian, 1st premium.	2 00
G. W. Ransom, Jackson, Jackson, 2d premium.	1 00
Trio partridge Cochin fowls—Amos F. Wood, Mason, 1st premium.	2 00
Trio partridge Cochin chickens—Ambrose Purchase, Jay, 1st premium.	2 00
C. W. Gillette, Parma, 2d premium.	1 00
Trio white Cochin fowls—Hayes & McElvain, Hastings, 1st premium.	2 00
J. B. Suylandt, Jackson, 2d premium.	1 00
Trio white Dorking fowls—N. A. Bennett, Mason, 1st premium.	2 00
Trio Dominique fowls—N. A. Bennett, Mason, 1st premium.	2 00
Pair blue game fowls—N. A. Bennett, Mason, 2d premium.	1 00
Trio black Spanish fowls—W. K. Barber, Hastings, 1st premium.	2 00
N. A. Bennett, Mason, 2d premium.	1 00
Trio white Leghorn fowls—D. W. Green, Saginaw City, 1st premium.	2 00
Ambrose Purchase, Jay, 2d premium.	1 00
Trio white Leghorn chickens—N. A. Bennett, Mason, 1st premium.	2 00
Hayes & McElvain, Hastings, 2d premium.	1 00
Trio black Polish fowls—N. A. Bennett, Mason, 1st premium.	2 00
W. A. Gibson, Jackson, 2d premium.	1 00
Trio white Polish fowls—W. A. Holcomb, Francisco, 1st premium.	2 00
W. A. Holcomb, Francisco, 2d premium.	1 00
Trio white Polish chicks—W. K. Barber, Hastings, 1st premium.	2 00
Trio silver Polish fowls—N. A. Bennett, Mason, 1st premium.	2 00
Ambrose Purchase, Jay, 2d premium.	1 00
Trio silver Polish chickens—Ambrose Purchase, Jay, 1st premium.	2 00
Trio golden Polish fowls—N. A. Bennett, Mason, 1st premium.	2 00

Trio Houdan fowls—Hayes & McElvain, Hastings, 1st premium.....	\$2 00
W. K. Barber, Hastings, 2d premium.....	1 00
Trio golden spangled Hamburg fowls—W. K. Barber, Hastings, 1st premium..	2 00
Trio silver spangled Hamburg fowls—N. A. Bennett, Mason, 1st premium....	2 00
Hayes & McElvain, 2d premium.....	1 00
Trio silver spangled Hamburg chickens—Ira A. Ladd, Adrian, 1st premium...	2 00
N. A. Bennett, Mason, 2d premium.....	1 00
Trio black breasted red game bantam chickens—W. K. Barber, Hastings, 1st premium.....	2 00
Trio black African bantam fowls—C. W. Gillett, Parma, 1st premium.....	2 00
N. A. Bennett, Mason, 2d premium.....	1 00
Trio silver-laced Seabright bantam fowls—N. A. Bennett, Mason, 1st premium.....	2 00
Pair bronze turkey fowls—C. D. Morse, Napoleon, 1st premium.....	2 00
Amos F. Wood, Mason, 2d premium.....	1 00
Pair pearl Guinea fowls—Ambrose Purchase, Jay, 1st premium.....	2 00
Pair white Pea fowls—Hayes & McElvain, Hastings, 1st premium.....	2 00
Pair Bremen geese—Ed. Driggs, Palmyra, 1st premium.....	2 00
Hayes & McElvain, Hastings, 2d premium.....	1 00
Pair Toulouse geese—N. A. Bennett, Mason, 1st premium.....	3 00
Pair Rouen ducks, chicks—Hayes & McElvain, Hastings, 1st premium.....	2 00
Ambrose Purchase, Jay, 2d premium.....	1 00
Pair Aylesbury ducks, chicks—Hayes & McElvain, Hastings, 1st and 2d premium.....	3 00
Pair Cayuga ducks—Ambrose Purchase, Jay, 1st premium.....	2 00
W. A. Holcomb, Francisco, 2d premium.....	1 00
Pair Muscovy ducks—Harry George, Jackson, 2d premium.....	1 00
Coop of eleven Muscovy ducks—Orville Tripp, Horton, 1st premium.....	2 00
Pair German canaries—Mrs. W. W. Andrews, Jackson, 1st premium.....	2 00
Cage six ferrets—Geo. Peck, Hillsdale, 1st.....	Diploma
Pair Sumatra game fowls—N. A. Bennett, Mason.....	Recommend discretionary
Coop pigeons—N. A. Bennett, Mason.....	Recommend discretionary
Jefferson Co. blue duck—W. A. Holcomb, Francisco, recommend premium....	\$1 00
Contrivance for raising chickens, artificial mother—C. S. Colgrove, Napoleon....	Dis.
Partridge Cochon hen—Hayes & McElvain, Hastings.....	Recommend first premium
Pair brown Leghorn hens—Hayes & McElvain, Hastings..	Worthy and should be in list
Trio black Cochon fowls—Hayes & McElvain, Hastings.....	Recommend premium
Pair brown Chinese geese one year old—G. W. Holcomb, Jackson, “ “	“ “
Trio golden Pheasant fowls—Ambrose Purchase, Jay.....	Recommend premium
Pair bronze geese—Ambrose Purchase, Jay, recommend premium.....	\$2 00
Pair gray geese—Ambrose Purchase, Jay, recommend premium.....	1 00
Pair white silk rabbits—Ambrose Purchase, Jay, recommend premium.....	50
Pair white tabby rabbits—Ambrose Purchase, Jay, recommend premium.....	50
Pair gray rabbits—Ambrose Purchase, Jay, recommend premium.....	50
Trio brown Leghorn fowls—D. W. Greene, Saginaw City..	recommend prem. 1 00
One dark Brahma hen—W. K. Barber, Hastings, 1st.....	Discretionary
Pair white rabbits—J. D. Jenks, Jackson, recommend premium.....	50

To Superintendent of Poultry:

SIR:—Your committee have to say in concluding their work that they believe they have had the pleasure and labor of examining the largest and best collection of poultry ever shown at a State Fair in Michigan. The competition was, in many cases, very great, and only by careful examination were we able to decide which were the best. Some classes were shown that the Executive Committee have not placed in their lists, and we would advise that they do so at their next meeting. We should further advocate that the arrangement be made to show the fowls all upon one plane, as some are too high or too low to show the qualities as they should. We recommend but few discretionary premiums, and then only when the classes have been omitted from the list. Especially would we notice the “artificial mother,” patented and shown by Mrs. S. C. Colgrove, Napoleon. This article is very useful in caring for young chicks from the time they are hatched till they are large enough to care for themselves. Four hundred and twenty (420) chickens were raised this season by this means from thirty-five (35) hens, being taken from the hen as soon as they are hatched, leaving the hen to lay again. The article is simple, easily made and used.

JOHN P. ALLISON,
Chairman Committee.

DIVISION E—FARM AND GARDEN PRODUCTS.

CLASS 25.—GRAIN AND SEEDS.

Bushel of red winter wheat, yield not less than twenty bushels to the acre— Frank Wilson, Jackson, 1st premium.....	\$6 00
Bushel white winter wheat, yield not less than twenty bushels to the acre— Geo. W. Ellison, Jackson, 1st premium.....	6 00
Wm. F. Near, Bath, 2d premium.....	4 00
Bushel spring wheat—Frank Wilson, Jackson, 1st premium.....	5 00
Bushel rye—David Woodman, Paw Paw, 1st premium.....	3 00
Four-rowed barley—David Woodman, Paw Paw, 1st premium.....	5 00
Hugh McDonald, Horton, Jackson, 2d premium.....	3 00
Oats, surprise—David Woodman, Paw Paw, 1st premium.....	5 00
English blue stem—Daniel F. Vickery, Charlotte, 2d premium.....	3 00
Hulless, J. O. Smith, Eaton Rapids.....	Discretionary
Dent corn in the ear—David Woodman, Paw Paw, 1st premium.....	\$5 00
Wm. Clapp, Hanover, 2d premium.....	3 00
Flint corn in the ear—David Woodman, Paw Paw, 1st premium.....	5 00
Wm. Clapp, Hanover, 2d premium.....	3 00
Bushel other variety of corn, eight rowed—Wm. Hall, Yew, 1st premium.....	5 00
Red nose corn—Wm. Hall, Yew, 2d premium.....	3 00
Bushel peas—Hugh McDonald, Horton, 1st premium.....	5 00
White beans—J. M. Blowers, Lawrence, 1st premium.....	5 00
Horace Tanner, Jackson, 2d.....	3 00
Bushel small clover seed—Daniel Woodman, Paw Paw, 1st premium.....	5 00
Timothy seed—J. M. Blowers, Lawrence, 1st premium.....	5 00
Buckwheat—Henry J. Crego, Jackson, 1st premium.....	4 00
W. A. Holcomb, Francisco, 2d premium.....	2 00
Best exhibition of a general assortment of seeds for field crops, greatest variety and quality of seeds to be taken into consideration—David Wood- man, Paw Paw, 1st premium.....	Diploma and 10 00
Best display of a collection of the several kinds of grain in heads, arranged and named—David Woodman, Paw Paw, 1st premium.....	5 00
Display of several varieties of wheat in heads—A. J. Armstrong, School- craft, 1st premium.....	Discretionary

Mr. Hall has received first and second premium on his corn and your committee think that the collection is very small for anything more in this class.

DENNIS WOLVERTON,

CHARLES S. WOOD,

Committee.

CLASS 26.—ROOTS AND VEGETABLES.

Best and greatest variety of roots for feeding stock—E. H. Wurts, East Sag- inaw, 1st premium.....	\$12 00
Best and greatest variety of roots and vegetables from any one garden—E. H. Wurts, East Saginaw, 1st premium.....	12 00
C. M. Hubbell, Ypsilanti, 2d premium.....	10 00
Three varieties of early potatoes, a peck or more of each kind—Edward Cronan, Waterloo, 1st premium.....	3 00
E. H. Wurts, East Saginaw, 2d premium.....	2 00
Late potatoes—E. H. Wurts, East Saginaw, 1st premium.....	3 00
Sample peck or more of any variety of early potatoes—Elijah Benn, Parma, 1st premium.....	3 00
Wm. Clapp, Hanover, 2d premium.....	2 00
Sample peck or more of sweet potatoes—C. M. Hubbell, Ypsilanti, 1st pre- mium.....	3 00
E. H. Wurts, East Saginaw, 2d premium.....	2 00
Dozen or more blood beets—C. M. Hubbell, Ypsilanti, 1st premium.....	2 00
E. H. Wurts, East Saginaw, 2d premium.....	1 00
Dozen or more turnip beets—C. M. Hubbell, Ypsilanti, 1st premium.....	2 00
E. H. Wurts, East Saginaw, 2d premium.....	1 00
Sugar beets—E. H. Wurts, East Saginaw, 1st premium.....	2 00
White or yellow beets—E. H. Wurts, East Saginaw, 1st premium.....	2 00
Dozen or more beets for table use—E. H. Wurts, East Saginaw, 1st premium..	2 00

Collection of five or more kinds of beets, ten of a kind—E. H. Wurts, East Saginaw, 1st premium.....	\$3 00
Dozen or more mangel wurtzel—C. M. Hubbell, 1st premium.....	2 00
E. H. Wurts, East Saginaw, 2d premium.....	1 00
Dozen or more orange carrots—E. H. Wurts, East Saginaw, 1st premium.....	2 00
C. M. Hubbell, Ypsilanti, 2d premium.....	1 00
Dozen white carrots—E. H. Wurts, East Saginaw, 1st premium.....	2 00
C. M. Hubbell, Ypsilanti, 2d premium.....	1 00
Dozen of any other variety of carrots—E. H. Wurts, East Saginaw, 1st premium.....	2 00
E. H. Wurts, East Saginaw, 2d premium.....	1 00
Collection of four or more varieties of carrots, ten of a kind—E. H. Wurts, East Saginaw, 1st premium.....	3 00
Dozen or more flat turnips—E. H. Wurts, East Saginaw, 1st premium.....	2 00
Dozen or more Swedes—E. H. Wurts, East Saginaw, 1st premium.....	2 00
C. M. Hubbell, Ypsilanti, 2d premium.....	1 00
Dozen of any other variety—E. H. Wurts, East Saginaw, 1st premium.....	2 00
Collection of four or more kinds of turnips, ten of a kind—E. H. Wurts, East Saginaw, 1st premium.....	3 00
Dozen or more parsnips—L. C. Lincoln, Greenville, 1st premium.....	2 00
E. H. Wurts, East Saginaw, 2d premium.....	1 00
Dozen or more salsify—L. C. Lincoln, 1st premium.....	2 00
E. H. Wurts, East Saginaw, 2d premium.....	1 00
Dozen or more winter radishes—E. H. Wurts, 1st premium.....	2 00
E. H. Wurts, 2d premium.....	1 00
Dozen summer radishes—E. H. Wurts, 1st premium.....	2 00
Collection of three or more kinds of radishes, ten of a kind—E. H. Wurts, 1st premium.....	3 00
Greatest variety of culinary vegetables grown by exhibitor—1st premium.....	5 00
Four heads drumhead cabbage—E. H. Wurts, 1st premium.....	2 00
Four heads conehead cabbage—E. H. Wurts, 1st premium.....	2 00
Savoy or curled cabbage—E. H. Wurts, 1st premium.....	2 00
Red cabbage—E. H. Wurts, 1st premium.....	2 00
Collection five or more kinds of cabbage, four or more of each kind—1st premium.....	3 00
Four heads cauliflower—E. H. Wurts, 1st premium.....	2 00
Six heads lettuce—E. H. Wurts, 1st premium.....	2 00
Six bunches of kale—E. H. Wurts, 1st premium.....	2 00
Dozen stems celery, bleached—1st premium.....	2 00
Dozen stems rhubarb—E. H. Wurts, 1st premium.....	2 00
Half dozen vegetable eggs—C. M. Hubbell, Ypsilanti, 1st premium.....	2 00
E. H. Wurts, East Saginaw, 2d premium.....	1 00
Dozen peppers—C. M. Hubbell, Ypsilanti, 1st premium.....	2 00
L. C. Lincoln, Greenville, 2d premium.....	1 00
Three varieties tomatoes, one dozen each—C. M. Hubbell, Ypsilanti, 1st premium.....	2 00
E. H. Wurts, East Saginaw, 2d premium.....	1 00
Peck of any variety of tomatoes—E. H. Wurts, East Saginaw, 1st premium.....	2 00
C. M. Hubbell, Ypsilanti, 2d premium.....	1 00
Peck white onions—E. H. Wurts, East Saginaw, 1st premium.....	2 00
C. M. Hubbell, Ypsilanti, 2d premium.....	1 00
Peck red onions—C. M. Hubbell, Ypsilanti, 1st premium.....	2 00
E. H. Wurts, East Saginaw, 2d premium.....	1 00
Peck yellow onions—C. M. Hubbell, Ypsilanti, 1st premium.....	1 00
Peck of Strasburg yellow onions—E. H. Wurts, East Saginaw, 2d premium.....	1 00
Collection five or more kinds of onions, not less than one-half peck of a kind—E. H. Wurts, East Saginaw, 1st premium.....	3 00
C. M. Hubbell, Ypsilanti, 2d premium.....	2 00
Five summer squashes—E. H. Wurts, East Saginaw, 1st premium.....	2 00
Five summer squashes, crook neck—Wm. Clapp, Hanover, 2d premium.....	1 00
C. M. Hubbell, Ypsilanti.....	Discretionary
Five marrow squashes—C. M. Hubbell, Ypsilanti, 1st premium.....	\$2 00
E. H. Wurts, East Saginaw, 2d premium.....	1 00
Five Hubbard squashes—C. M. Hubbell, Ypsilanti, 1st premium.....	2 00
D. McOmber, Hastings, 2d premium.....	1 00

Single squash—C. M. Hubbell, Ypsilanti, 1st premium.....	\$2 00
E. H. Wurts, East Saginaw, 1st premium.....	2 00
Collection of five or more kinds of squashes, three of a kind—E. H. Wurts, East Saginaw, 1st premium.....	3 00
C. M. Hubbell, Ypsilanti, 2d premium.....	2 00
Two sweet pumpkins, Indiana—E. H. Wurts, East Saginaw, 1st premium....	2 00
C. M. Hubbell, Ypsilanti, 2d premium.....	1 00
Two field pumpkins—E. H. Wurts, East Saginaw, 1st premium.....	2 00
Three water-melons—C. M. Hubbell, Ypsilanti, 1st premium.....	2 00
Three water-melons, long—E. H. Wurts, East Saginaw, 2d premium.....	1 00
P. E. Pierce, Jackson.....	Discretionary
Three musk-melons—E. H. Wurts, East Saginaw, 1st premium.....	\$2 00
Three musk-melons—E. H. Wurts, East Saginaw, 1st premium.....	2 00
Three nutmeg-melons—C. M. Hubbell, Ypsilanti, 1st premium.....	2 00
E. H. Wurts, East Saginaw, 2d premium.....	1 00
Three citrons—E. H. Wurts, East Saginaw, 1st premium.....	2 00
E. H. Wurts, 2d premium.....	1 00
Collection of three or more kinds of melons, three or more of each kind—C. M. Hubbell, Ypsilanti, 1st premium.....	3 00
E. H. Wurts, East Saginaw, 2d premium.....	2 00
Five cucumbers—C. M. Hubbell, Ypsilanti, 1st premium.....	2 00
E. H. Wurts, East Saginaw, 2d premium.....	1 00
Half peck garden peas—E. H. Wurts, East Saginaw, 1st premium.....	2 00
E. H. Wurts, 2d premium.....	1 00
Half peck Lima beans—E. H. Wurts, 1st premium.....	2 00
Peck bush beans, German wax—E. H. Wurts, 1st premium.....	2 00
Half peck wax beans—E. H. Wurts, 1st premium.....	2 00
Collection of three or more kinds garden beans, one-half peck or more of each kind—E. H. Wurts, 1st premium.....	3 00
Dozen ears early sweet corn—E. H. Wurts, 1st premium.....	2 00
C. M. Hubbell, Ypsilanti, 2d premium.....	1 05
Dozen ears late sweet corn—Jacob Longyear, Grass Lake, 1st premium.....	2 00
Dozen ears late sweet corn, evergreen—Wm. Hall, Yew, 2d premium.....	1 00
C. M. Hubbell, Ypsilanti.....	Discretionary
Dozen ears popcorn, rice—E. H. Wurts, East Saginaw, 1st premium.....	\$2 00
Wm. Hall, Yew, 2d premium.....	1 00
Six heads sunflower, E. H. Wurts, East Saginaw, 1st premium.....	2 00
Six stems Swiss chard—E. H. Wurts, 1st premium.....	2 00
Six stems parsley—E. H. Wurts, 1st premium.....	2 00
Six heads of any sweet or pot herb—Daniel F. Vickery, Charlotte, 1st pre- mium.....	2 00
Collection of four or more kinds of sweet or pot herb—E. H. Wurts, East Sag- inaw, 1st premium.....	3 00
Daniel F. Vickery, Charlotte, 2d premium.....	2 00
Six stems kohlrabi—E. H. Wurts, East Saginaw, 1st premium.....	2 00
Dozen Bassano beets—E. H. Wurts.....	Discretionary
Five Butman squashes—E. H. Wurts.....	Discretionary
Five marblehead squashes—E. H. Wurts.....	Discretionary
Six stalks sage—E. H. Wurts.....	Discretionary
Six stems summer savory—E. H. Wurts.....	Discretionary
Six stems winter savory—E. H. Wurts.....	Discretionary
Six stems sweet marjoram—E. H. Wurts.....	Discretionary
Six stems thyme—E. H. Wurts.....	Discretionary
Six stems Rosemary—E. H. Wurts.....	Discretionary
Six stems cress, or peppergrass—E. H. Wurts.....	Discretionary
Six bunches peppermint—E. H. Wurts.....	Discretionary
Sample of artichoke—E. H. Wurts.....	Discretionary
Sample of chickory—E. H. Wurts.....	Discretionary
Sample of endive—E. H. Wurts.....	Discretionary
Sample of peanuts—E. H. Wurts.....	Discretionary
Sample of horse radish—E. H. Wurts.....	Discretionary
Sample of martynia—E. H. Wurts.....	Discretionary
Sample of okra or gumbo—E. H. Wurts.....	Discretionary
Three heads of cabbage, "Flat Dutch"—John A. Waltz, Jackson.....	Discretionary
Specimen Japan beans—L. Wilcox, Jackson.....	Discretionary

Five Canada crookneck squashes—E. H. Wurts, East Saginaw.....	Discretionary
Five Vermont crookneck squashes—E. H. Wurts, East Saginaw.....	Discretionary
GEO. F. STARKWEATHER, C. W. MORRILL, J. C. BENNIS,	

Committee.

CLASS 28.—BUTTER AND CHEESE.

Twenty-five pounds domestic butter made at any time—Mrs R. M. Cook, Charlotte, 1st premium.....	\$25 00
J. T. Weeks, Napoleon, 2d premium.....	20 00
Mrs. A. McClary, Galesburgh, 3d premium.....	15 00
Display of cheese, not less than three in number—D. H. Ranney, Jackson, 1st premium.....	15 00
Horace Tanner, Jackson, 2d premium.....	10 00
Display of cheese, by any factory—Power Cheese Factory, Farmington, 1st premium.....	35 00
Samuel Morrell, Charlotte, 2d premium.....	25 00
Willis J. Johnson, Reading, 3d premium.....	15 00

DENNIS WOLVERTON,
CHARLES S. WOOD,

Committee.

CLASS 29.—SUGAR, HONEY, AND BEE HIVES.

Gallon maple syrup—Daniel F. Vickery, Charlotte, 1st premium.....	\$3 00
J. M. Blowers, Lawrence, 2d premium.....	2 00
Ten pounds maple sugar—J. M. Blowers, 1st premium.....	5 00
Specimen box honey—Daniel F. Vickery, 1st premium.....	3 00
Joseph T. Butler, Jackson, 1st premium.....	3 00
A. G. True, Jackson, 2d premium.....	2 00
A. G. True, 2d premium.....	2 00
Bee hive—Geo. Welch, Marshall, 1st premium.....	5 00
Display of sugar—J. T. Weeks, Napoleon, 1st premium.....	5 00

G. F. STARKWEATHER,
C. M. MORRILL,
J. C. BEMISS,

Committee.

CLASS 30.—BREAD AND PICKLES.

Three loaves of salt rising bread—Mary E. True, Jackson, 1st premium.....	\$3 00
Mrs. J. F. Drew, Jackson, 2d premium.....	2 00
Three loaves of yeast bread—Calvin Wing, Jackson, 1st premium.....	3 00
Geo. Chisholm, Marshall, 2d premium.....	2 00
Three loaves soda rising bread—Mrs. L. Eggleston, Jackson, 1st premium....	3 00
Three loaves of brown bread—D. H. Ramsey, Jackson, 1st premium.....	3 00
D. H. Ramsey, 2d premium.....	2 00
Flour bread, made by girl sixteen years or under—Mrs. L. Eggleston, 1st pre- mium.....	3 00
J. T. McCall, Jackson, 2d premium.....	2 00
Display pickled vegetables—Nina Miller, Jackson, 1st premium.....	5 00
Collection pickles—A. F. Clark, Saline, 1st premium.....	5 00
Pickled vegetables—L. C. Lincoln, Greenville, 1st premium.....	5 00
Mrs. L. Eggleston, Jackson, 2d premium.....	3 00
Yeast breakfast rolls—Nina Miller, 1st premium.....	Discretionary
Sample of crullers—Nina Miller, 1st premium.....	Discretionary
Jar of pickled lamphu—Mrs. D. Merriman, Jackson, 1st premium.....	Discretionary
Jar of ripe pickled cucumbers—Mrs. D. Merriman, 1st premium.....	Discretionary
Samples of rusks—D. H. Ramsey, 1st premium.....	Discretionary
Samples of doughnuts—D. H. Ramsey, 1st premium.....	Discretionary
Plate biscuit—H. T. Cole, Rives Junction, 1st premium.....	Discretionary
Graham gems—D. H. Ramsey, Jackson, 1st premium.....	Discretionary

GEO. STARKWEATHER,
C. M. MORRILL,
J. C. BEMISS,

Committee.

CLASS 31.—SOAPS, ETC.

Display of washing soap—Casper Shulte, Detroit, 1st premium.....	Diploma
Shuler & Clark, Jackson, 2d premium.....	Diploma

Samples of chewing and smoking tobacco exhibited by Geo. Soyer & Co., are very choice and the committee award them a diploma and wish they had it in their power to do better for them.

H. A. NORTON,
B. BRITTAIN,
Committee.

CLASS 32.—MISCELLANEOUS.

Thorley's horse and cattle food—P. H. Rymal, Jackson, 1st premium.....	Diploma
Box pioneer cigars—M. Loennecker, Jackson, 1st premium.....	Diploma
Box central city cigars—M. Loennecker, 1st premium.....	Diploma
Box golden crown cigars—M. Loennecker, 1st premium.....	Diploma
Box square smoke cigars—M. Loennecker, 1st premium.....	Diploma

GEO. F. STARKWEATHER,
C. M. MORRILL,
J. C. BEMISS,
Committee.

DIVISION F.

CLASS 33.—PLOWS.

Plow for turning sod land—Ann Arbor Agricultural Co., Ann Arbor 1st premium.....	Diploma and	\$5 00
Plow for turning under stubble—Kimball & Austin Manufacturing Co., Kalamazoo, 1st premium.....		5 00
Plow for general use—Gale Manufacturing Co., Albion, 1st premium.....	Diploma and	10 00
N. G. Pinney, New Hudson, discretionary.....		5 00
Plow for general use made in any other State—South Bend Iron Works, South Bend, Ind., 1st premium.....	Diploma and	5 00
Heavy plow for new land—Kimball & Austin Manufacturing Co., 1st premium.....	Diploma and	5 00
Attachment for any plow, etc.—Three Rivers Plow Co., Three Rivers, 1st premium.....		5 00
John E. Thatcher, Woodstock, discretionary.....		3 00
Self-clearing plow coulter—Kimball & Austin Manufacturing Co., 1st premium.....	Diploma	
Gang plow—Gale Manufacturing Co., 1st premium.....	Diploma	
Display of plows—Gale Manufacturing Co., 1st premium.....		\$50 00
Kimball & Austin Manufacturing Co., 2d premium.....		25 00
Three Rivers Plow Co., 3d premium.....		15 00
Plow for one horse—Gale Manufacturing Co., discretionary.....	Diploma	
Plow for plowing marsh land—Gale Manufacturing Co., discretionary.....	Medal	
Plow sulky attachment—P. P. Mast & Co., Springfield, Ohio, discretionary.....	Diploma	

JOHN D. CLARK,
J. V. HARMON,
S. W. CURTIS,
Committee.

CLASS 34.—FIELD ROLLER, ETC.

Field roller—J. A. Anderson, Otsego, 1st premium.....	\$5 00
Harrow for general use—F. D. Bennett, Jackson, discretionary premium.....	5 00
J. F. Shaw, Sterling, Ill., 1st premium.....	5 00
Iron harrow—James E. Gress Tecumseh, 1st premium.....	3 00
Wooden harrow—Kimball & Austin Manufacturing Co., Kalamazoo, 1st premium.....	3 00
One-horse cultivator shovel plow—Abbott, Brew & Co., Cleveland, Ohio, 1st premium.....	3 00
Display of cultivators—Robbins Cultivator Co., Jackson, 1st premium.....	50 00
P. P. Mast, Springfield, Ohio, 2d premium.....	25 00
Ann Arbor Agricultural Co., Ann Arbor, 3d premium.....	10 00
Lotta & Shupe, Battle Creek, discretionary.....	5 00

J. E. HARMON,
W. SCHRAM,
J. D. CLARK,
Committee.

CLASS 35.—TWO-HORSE SEED DRILLS.

Two-horse grain drill—Superior, Thomas, Ludlow & Rodgers, Springfield, Ohio, 1st premium.....	\$25 00
Farmers' Friend Manufacturing Co., Dayton, Ohio, 2d premium.....	15 00
Two-horse broadcast seeder—Lotta & Shupe, Battle Creek, 1st premium.....	20 00
P. P. Mast, Springfield, Ohio, 2d premium.....	10 00
Grass and clover seed sower for horse power—F. Danforth, Olivet.....	Diploma
Ashes and plaster sower, horse power—Abbot, Brew & Co., Cleveland, Ohio.....	Diploma
Geo. H. Fowler, Detroit, discretionary.....	\$10 00
Corn and Bean planter, horse power—Wait Manufacturing Co., Grand Haven.....	Diploma
Machine for sowing plaster, etc.—F. Danforth, Olivet.....	Diploma
Hand corn-planter—Abbott, Brew & Co., Cleveland, Ohio.....	Diploma
Corn and bean drill, one horse—Hoosier Drill Co., Milton, Ind.....	Worthy of notice

JOHN F. DREW,
DAVID SHARER,
H. P. SLY,
Committee.

CLASS 36.—HAYING AND HARVESTING IMPLEMENTS.

Horse rake—Gale Manufacturing Co., Albion, 1st premium.....	\$15 00
Cowham & Scofield, Jackson, 2d premium.....	10 00
A. W. Coates, Alliance, Ohio, 3d premium.....	5 00
Chapman's railway pitching apparatus—Wm. A. Anderson, Albion.....	Silver medal

PHINEAS GRAVES,
H. HOPKINS,
J. S. CLAYTON,
Committee.

CLASS 37.—MACHINES CONNECTED WITH THE PREPARATION OF CROPS FOR MARKET.

Horse power for farm use—McLelland & Bennett, Wellington, Ohio, 1st premium.....	\$25 00
A. W. Gray, Agent, Middletown, Vt., 2d premium.....	15 00
Greatest display of feed cutters—Ann Arbor Agricultural Co., Ann Arbor, 1st premium.....	20 00
G. H. Fowler, Detroit, 2d premium.....	10 00
Display corn-shellers—G. H. Fowler, 1st premium.....	20 00
Ann Arbor Agricultural Co., Ann Arbor, 2d premium.....	10 00
Fanning mill or grain cleaner—J. K. Edgerton, Fort Wayne, Ind.....	Diploma
Straw and stalk cutter, hand power—Wait Manufacturing Co., Grand Haven.....	Diploma
Best contrivance for feeding hogs—P. P. Mast, Springfield, Ohio.....	Medal
Portable cider mill—Abbott, Brew & Co., Cleveland, 1st premium.....	Diploma
Portable grist mill—G. S. Wormer & Sons, Detroit, 1st premium.....	Medal
Cider press, atmospheric—John Clark, Pontiac, 1st premium.....	Discretionary
Threshing machine—John Farmer, agent, Battle Creek, 1st premium.....	Discretionary
Clover huller—Birdsell, Geo. Kellogg, South Bend, Ind., 1st premium.....	Discretionary

Your committee, to whom was assigned the duty of awarding premiums in Division F., Class 37, beg leave to submit their report as herein recorded.

W. H. ROWLEY,
JAMES C. HANNA,
G. W. RYNOK,
Committee.

CLASS 38.—MISCELLANEOUS FARM ARTICLES.

Half dozen spading forks, 4 tine—Withington, Cooley & Co., Jackson, 1st premium.....	\$2 00
Half dozen manure forks, 4 tine—Withington, Cooley & Co., 1st premium.....	2 00
Half dozen manure forks, 6 tine—Withington Cooley & Co., 1st premium.....	2 00
Half dozen straw forks, 3 tine—Withington, Cooley & Co., 1st premium.....	2 00
Half dozen straw forks, 4 tine—Withington, Cooley & Co., 1st premium.....	2 00
Half dozen straw forks, 2 tine—Withington, Cooley & Co., 1st premium.....	2 00
Half dozen socket hoes—Withington, Cooley & Co., 1st premium.....	2 00
Half dozen shank hoes (solid)—Withington, Cooley & Co., 1st premium.....	2 00
Drag sawing machine, McLennan & Bennett, Wellington, Ohio, 1st premium.....	20 00
Half dozen steel garden rakes—Withington, Cooley & Co., Jackson, 1st premium.....	2 00
Circle sawing machine gear—W. D. King & Co., Pontiac, 1st premium.....	20 00

Circle sawing machine belt—W. D. King & Co. Pontiac.....	Worthy of comment
Four round tined potato hooks—Withington, Cooley & Co., 1st premium.....	\$2 00
Assortment of garden tools—Withington, Cooley & Co., 1st premium.....	2 00
Wheelbarrow—Withington, Cooley & Co., 1st premium.....	2 00
Six corn knives, hook shape—Withington, Cooley & Co., 1st premium.....	1 00
Grain cradle—Withington, Cooley & Co., 1st premium.....	2 00
Six axes—Warner & Dodge, Jackson, 1st premium.....	2 00
Grind stone and hangings—Chas. Hastings, Lagrange, Ohio, 1st premium.....	2 00
Fruit ladder—George Welch, Marshall.....	1 00
Hand pump for wells—Bean Manufacturing Co., Hudson, 1st premium.....	2 00
Cistern pump—Bean Manufacturing Co., Hudson, 1st premium.....	1 00
Farm gate—Ebenezer Young, Camden, 1st premium.....	1 00
Farm gate (automatic)—P. S. Warren, Marshall, discretionary.....	5 00
Worthy of premium for first-class and perfect working automatic gate, but too expensive for common farm use.	

Wind mill (8-ft. wheel) and pump—Bignall Wind Mill Co., St. Charles Ill.
 Worthy of commendation
 Stump puller, capable of lifting ten tons—Moses Bean, Jackson, 1st premium. \$20 00

D. SCHRAM,
 E. VAN HORN,
 W. W. TUTTLE.
Committee.

CLASS 39.—DAIRY AND HOUSEHOLD ARTICLES.

Milk safe—Comstock Adrian, 1st premium.....	Diploma
Washing machine—H. B. Fry, Leslie, 1st premium.....	\$3 00
Clothes wringer—Ira B. Stillman, Hornellsville, N. Y.....	Discretionary
Fruit dryer and baker combined—Jones Bros., Sturgis, 1st premium.....	Diploma
Fruit dryer, stove pipe shelf, etc.—J. P. Hinshaw, Brooklyn.....	Discretionary
Coffee burner—Parsons, Bros. & Hall, Ypsilanti, 1st premium.....	\$1 00
Clothes dryer—Ira C. Traverse, Grand Rapids, 1st premium.....	1 00
Portable cider press and grater—Boomer & Boschert Press Co., Syracuse, N. Y., 1st premium.....	Diploma
Portable cider press, power attachment—Boomer & Boschert Press Co., Syracuse, N. Y., 1st premium.....	Commendation
Jones' Eureka fruit and vegetable knife—E. R. Jones & Co., New York, N. Y., 1st premium.....	Diploma
Assortment of wooden ware for dairy—J. E. Higgins, Holland, 1st premium.....	Diploma
Beefsteak broilers—Parsons, Bros. & Hall, Ypsilanti.....	Recommended
Carpet stretcher—Geo. Welch, Marshall, Mich., discretionary.....	Diploma
Lamp cleaner—N. W. Stevens, Jonesville.....	Discretionary
Apple slicer—Jones Bros., Sturgis.....	Discretionary
Apple corer—Jones Bros., Sturgis.....	Discretionary

GEO. F. LAY,
 ALBERT GATES,
 GEORGE BRYANT,
Committee.

DIVISION G.

CLASS 40.—WAGONS AND CARRIAGES.

Two-spring phaetons—J. W. Hewett and Son, Jackson, 1st premium.....	Diploma and	\$5 00
Top buggy—Henderson, Smith & Co., Muskegon, 1st premium.....	Diploma and	5 00
Top buggy, square box—Dorrill & Gillman, Jackson 2d premium.....	Diploma and	5 00
Buggy without top—Dorrill & Gillman, Jackson, 1st premium.....	Diploma and	5 00
Geo. H. Gale, Jackson, 2d premium.....		5 00
Trotting sulky—A. Bedford, Coldwater, Mich., 1st premium.....	Diploma and	5 00
J. W. Hewett & Son, Jackson, 2d premium.....		5 00
Farm wagon for all purposes—Austin, Tomlinson & Webster Manufacturing Co., Jackson, 1st premium.....		10 00
Spring wagon for market—Dorrill & Gillman, Jackson, 1st premium.....		10 00
Arthur Wood, Grand Rapids, 2d premium.....		5 00
Single team wagon—Austin, Tomlinson & Webster Manufacturing Co., Jackson, 1st premium.....		5 00

One pair bob-sleighs for lumbering—Austin, Tomlinson & Webster Manufacturing Co., Jackson.....	Diploma
One pair of trucks—Austin, Tomlinson & Webster Manufacturing Co., Jackson.....	Diploma
One carriage jack—Chas. Welch, Almena.....	Diploma
Display of spring wagons, Dorrell & Gillman, Jackson, 1st premium.....	\$25 00
Display of the several articles in this class—Austin, Tomlinson & Webster Manufacturing Co., 2d premium.....	15 00
Buggy top—Henderson, Smith & Co., Muskegon.....	Discretionary
Iron platform for spring wagon—Alexander Beach, Linden.....	Discretionary
Hearse—R. McQueen, Jackson.....	Discretionary

By reason of misunderstanding, when articles were to have been on the ground, for which Mr. Gale was proved not to have been blameworthy, his goods were not passed upon by your committee. The Executive Committee, at its evening meeting, Sept. 22, appointed a committee consisting of President Humphrey and Messrs. Sterling and Kimball, to make suitable awards to Mr. Gale's exhibition. In accordance therewith the committee award as follows:

Two horse family carriage, G. 40, No. 1, 1st premium.....	Diploma and	\$10 00
One horse family carriage, G. 40, No. 21.....	Diploma and	5 00
Three-spring phaeton, G. 40, No. 61.....	Diploma and	5 00

ALEXANDER BEACH,
CLARK HALL,
JAMES RIGGS,

Committee.

DIVISION H—MACHINERY.

CLASS 41.—MACHINERY FOR WORKING UPON IRON AND OTHER METALS.

Portable steam engine—M. Rumley, Jackson, 1st premium.....	Medal
Stationary steam engine—Jackson Foundry and Machine Co., Jackson, 1st premium.....	Medal
Iron shaping machine with cutter heads—G. S. Wormer & Sons, Detroit, 1st premium.....	Diploma
A. F. Prentiss & Co's iron drilling machine—G. S. Wormer, 1st premium.....	Diploma
Fan blower—G. S. Wormer & Sons, 1st premium.....	Diploma
Portable forge, size 2—Cleveland Steam Gauge Co., Cleveland, Ohio.....	Diploma
Self oiler for machinery—Geo. P. Maloney, Jackson.....	Diploma
Low water detector—H. D. Cutting, Clinton.....	Medal
Patent compression coupling—G. S. Wormer & Sons, Detroit.....	Medal
Abram's patent flue brush—G. S. Wormer & Sons, Detroit.....	Worthy of commendation
Upright saw band—T. P. Frank, Buffalo, N. Y.....	Discretionary premium
Belt fastening machine and punch—Will H. Wood, Detroit.....	Worthy of commendation
Scroll saw—J. W. Bollinger, Jackson.....	Diploma
Planer and matcher—J. B. Frank, Buffalo.....	Medal
Heading machine—G. S. Wormer & Sons, Detroit.....	Diploma
Saw mill head blocks with dogs—Geo. Rodebaugh, Jackson.....	Worthy of commendation
Surface planer—T. P. Frank, Buffalo, N. Y.....	Medal
Stave jointer, foot power—G. S. Wormer & Sons, Detroit.....	Worthy of commendation
Brick making machine—John George & Sons, Jackson.....	Diploma
Press brick machine—John George & Sons, Detroit.....	
Grocers' coffee mill—G. S. Wormer & Sons, Detroit.....	Worthy of commendation
Hand fire engine—Bean Manufacturing Co., Hudson.....	Diploma
Garden engine—Bean Manufacturing Co., Hudson.....	Medal
Steam fire pump—E. Denis, Jackson.....	Discretionary premium
Steam fire pump—E. Denis, Jackson.....	Discretionary premium
Steam fire pump—E. Denis, Jackson.....	Discretionary premium
Steam fire pump—E. Denis, Jackson.....	Discretionary premium
Steam pump and boiler—E. Denis, Jackson.....	Discretionary premium
Boiler and feed pump—E. Denis, Jackson.....	Discretionary premium
Boiler and feed pump—E. Denis, Jackson.....	Discretionary premium
Wiley & Russel's lightning screw plate with taps and dies—G. S. Wormer & Sons, Detroit.....	Discretionary premium
Set Stevens' patent pipe wrenches—G. S. Wormer & Sons, Detroit.....	Discretionary premium
Freedman's patent injector—G. S. Wormer & Sons, Detroit.....	Discretionary premium

Dudgeon's patent roller flue expander—G. S. Wormer & Sons, Detroit.....	Discretionary premium
Spice mill—G. S. Wormer & Sons, Detroit.....	Worthy of commendation
Gear cutting machine—G. S. Wormer & Sons, Detroit.....	Discretionary premium
B. F. Sturtevant's steel pressure blower—G. S. Wormer & Sons, Detroit.....	Discretionary premium
Boiler arch front—Jackson Foundry Co., Jackson.....	Discretionary premium
Steam boiler tubular—Jackson Foundry & Machine Co., Jack- son.....	Worthy of commendation
Hand lever punch—H. D. Cutting, Clinton.....	Worthy of commendation
Saw mill carriage and head blocks—George Rodebaugh, Jack- son.....	Discretionary premium
Display loose pulley oilers—E. Denis, Jackson.....	Discretionary premium
Display emery grinding machine—E. Denis, Jackson.....	Worthy of commendation
Display saw arbors—E. Denis, Jackson.....	Worthy of commendation
Speed lathe—E. Denis, Jackson.....	Worthy of commendation
Wood lathe—E. Denis, Jackson.....	Worthy of commendation
Boiler feed pump—E. Denis, Jackson.....	Worthy of commendation
John Hutchinson, of Three Rivers, Mich., exhibits a power corn sheller not entered for premium, as the exhibitor was unable to get the machine on the grounds in time. The machine, in the opinion of the awarding committee, has decisive merit, and we as a committee call the attention of the superintendent in charge of it, and recom- mend that it be classified in their premium list hereafter in Class H.	
New machine for working on wood—Excelsior machine, Jackson Excel- sior Works, Jackson.....	Discretionary
Article relating to hydraulics—Conkling's Bottling Works, D. M. Conk- ling, Jackson.....	Discretionary
Superior quality of chilled iron for plow castings—Gale Manufacturing Co., Albion.....	Discretionary
Three post-hole diggers—R. E. Quick, Paw Paw.....	Discretionary

A. S. KING,
A. J. EMLAIN,
Committee.

DIVISION I—MANUFACTURED GOODS.

CLASS 43.—HOME MADE.

Pair woolen blankets—Mrs. S. F. Drew, Jackson, 1st premium.....	\$3 00
P. A. Sutton, Jackson, 2d premium.....	2 00
Ten yards woolen flannel—J. H. Corvin, Grass Lake, 1st premium.....	3 00
P. A. Sutton, Jackson, 2d premium.....	2 00
Hearth rug—Robert W. Elston, Muskegon, 1st premium.....	2 00
Nellie E. Jenkins, Jackson, 2d premium.....	1 00
Ten yards rag carpet—H. B. Fry, Leslie, 1st premium.....	3 00
Thirty-two yards rag carpet—Eliza Catlin, Jackson, 2d premium.....	2 00
Pair woolen stockings—George Chisholm, Marshall, 1st premium.....	1 00
Mrs. J. F. Drew, Jackson, 2d premium.....	50
Pair woolen mittens—Mrs. J. F. Drew, Jackson, 1st premium.....	1 00
Richard Elliott, Lansing, 2d premium.....	50
Two pounds stocking yarn—Calvin Wing, Jackson, 1st premium.....	2 00
Mrs. J. F. Drew, Jackson, 2d premium.....	1 00
Pair cotton socks—Mrs. Richard Elliott, Lansing, 1st premium.....	1 00
Mrs. Jas. De Puy, Jackson, 2d premium.....	50
Pair white cotton stockings—Mrs. Richard Elliott, Lansing, 1st premium.....	1 00
Ten yards tow cloth—Sarah Barber, Fairfield, 1st premium.....	3 00
Greatest and best variety of articles manufactured by one family—Mrs. Rich- ard Elliott, Lansing, 1st premium.....	10 00
Ten yards linen cloth—Sarah Barber, Fairfield.....	Discretionary premium

MRS. L. B. STEINHOFF,
MRS. S. E. WELLS,
Committee.

CLASS 44.—FACTORY MADE.

Display of silk goods—Camp Morrill & Camp, Jackson, 1st premium, Medal and	\$3 00
Display of carpets—Camp Morrill & Camp, 1st premium. Diploma and	3 00
Display of hearth rugs—Camp Morrill & Camp, 1st premium. Diploma	

MRS. R. G. HART,
MRS. C. W. GREENE.
MRS. H. N. LATHROP,
Committee.

CLASS 45.—ARTICLES OF DRESS.

Display silk hats—Holden & Tinker, Jackson	Diploma
Display soft hats—Holden & Tinker	Diploma
Display boys' caps—Holden & Tinker	Diploma
Gents' furs—Holden & Tinker	Diploma
Fancy silk h'dkf's—Holden & Tinker	Diploma

MRS. R. G. HART,
MRS. C. W. GREENE.
MRS. H. N. LATHROP,
Committee.

CLASS 46.—ARTICLES OF LEATHER.

Traveling trunk—Hobbs & Bliss, Jackson, 1st premium	\$3 00
Carpet bag—Hobbs & Bliss, Jackson, 1st premium	1 00
Lady's satchel—Hobbs & Bliss, Jackson, 1st premium	1 00
Pair gent's French kid summer boots—John Kelly, Jackson, 1st premium	1 00
Pair gent's winter boots—John Kelly, 1st premium	1 00
Pair lady's summer walking boots—John Kelly, 1st premium	1 00
Double carriage harness—Hobbs & Bliss, Jackson, 1st premium. Diploma and	3 00
C. Delanter, Jackson, 2d premium	2 00
Single or buggy harness—Hobbs & Bliss, Jackson, 1st premium, Diploma and	3 00
C. Delanter, Jackson, 2d premium	2 00
Double harness for farm—Hobbs & Bliss, Jackson, 1st premium, Diploma and	3 00
C. Delanter, 2d premium	2 00
Gent's riding saddle—Mrs. C. C. Burt, Jackson, 1st premium	2 00
Ladies' side saddle—Dan Schuyler, 1st premium	2 00
Horse collar—C. Delanter, Jackson, 1st premium	1 00
Display traveling bags—Hobbs & Bliss, Jackson, 1st premium	Diploma
Fancy buffalo robe, cinnamon and polar—C. C. Burt, Jackson, 1st premium ...	\$1 00
Fancy lap-blanket—Hobbs & Bliss, Jackson.	
Display lap-ropes, bear, badger, etc.—Holden & Tinker, Jackson	Rec. Diploma
Display fancy lap-blankets—Holden & Tinker, Jackson	Rec. Diploma
Hack harness—C. Delanter, Jackson	Rec. Diploma
Machine to hold boot or shoe for stitching or pegging—L. Tichener, Chelsea	Rec. Diploma
Pair misses buff, pebble goat boots—John Kelly, Jackson	Rec. Diploma
Pair misses kid walking boots—John Kelly	Rec. Diploma
Child's laced walking boots—John Kelly	Rec. Diploma
Pair child's kid slippers—John Kelly	Rec. Diploma
Goat skin tanned hair on, used for carriage rug—Austin Blair, Jr.—Jackson	Rec. Diploma
Display whips—Hobbs & Bliss, Jackson	Rec. Diploma
Display trunks—Hobbs & Bliss, Jackson	Rec. Diploma
Shawl strap—D. S. Mathews, Adrian	Rec. Diploma
Bridle—Dan Schuyler, Jackson	Rec. Diploma

C. P. CHIDESTER,
JOHN BYERS,
E. J. SHIRTS,
Committee.

CLASS 47.—ARTICLES OF FURNITURE.

Center table—M. H. J. Leigston, Ypsilanti, 1st premium.....	\$3 00
Center table—M. H. J. Leigston, Ypsilanti, 2d premium.....	2 00
Lambrequin—Camp, Morrill & Camp, Jackson, 1st premium.....	2 00
Spring mattress—Comstock Bros., Adrian, 1st premium.....	2 00
Assortment school furniture—Mich. School Furniture Co., Northville, 1st premium.....	Medal
Ten common wood seat chairs—Stewart, Hale & Co., Otsego.....	Rec. Diploma
Sixteen common wood seat rocking chairs—Stewart, Hale & Co.....	Dis. Premium
Wooden slat window shades—E. W. Brady, Davenport, Iowa.....	Rec. Diploma
Lady's inlaid toilet box—S. Lewis, Jackson.....	Rec. Diploma and \$2 00
Lady's inlaid chess board—S. Lewis.....	Rec. 2 00
Bird cage—Mrs. E. Fossil, Jackson.....	Rec. 2 00
Display ladies' sewing tables—Abe Land, Hudson.....	Rec. Diploma
Assortment church furniture—Mich. School Furniture Co., Northville.....	Rec. Diploma
Collection imitation rosewood coffins and caskets—Powers & Walker, Grand Rapids.....	Rec. Diploma
Exhibition caskets and coffins—J. Weeks & Sons, Jackson.....	Rec. Diploma
Collection undertaker's goods—J. Weeks & Sons, Jackson.....	Rec. Diploma
Display fancy wooden ware—W. J. Fitch, Madison.....	Rec. Diploma
Display burial caskets—R. McQueen, Jackson.....	Rec. Diploma
Picture frames, inlaid, made with knife—H. B. Fry, Leslie, Rec. Diploma and.....	\$1 00

JOHN P. ALLISON,
J. Q. A. BURRINGTON,
MORTIMER GILBERT,
D. WOODMAN,

Committee.

CLASS 48.—STOVES, ETC.

Display stoves—Mich. Stove Co., Detroit, 1st premium.....	Silver Medal
Display oil stoves—Fred W. Sedgwick, agent, Jackson.....	Dis. premium
Cooking stove for wood fire—Mich. Stove Co., 1st premium.....	Medal
Cooking stove for coal fire—Mich. Stove Co., 1st premium.....	Medal
Steam cooker, New Excelsior—W. H. Adams, agent, Kalamazoo, 1st premium, Diploma	
Furnace for heating houses, etc.—Jackson Foundry and Machine Co., Jackson, 1st premium.....	Silver Medal
Base burning coal stove—Mich. Stove Co., Detroit, 1st premium.....	Diploma
Galvanized iron cornice—J. E. Barrett, Jackson, 1st premium.....	\$2 00
Galvanized iron vase—Thomas McGraw, Jackson.....	Rec. Diploma
Pocket stove—W. Crofoot, Jackson.....	Rec. Diploma
Heat regulator and smoke consumer—Drake & Halsey, Adrian.....	Rec. Diploma
Wrought iron burial vault—Henry Nieman, Ypsilanti.....	Rec. Diploma

Your committee found several fine collections of stoves, but they were not exhibited for competition, leaving the Michigan Stove Company the only exhibitor.

E. J. SHIRTS,
JOHN BYERS,
C. D. CHIDESTER,

Committee.

DIVISION K.—PAINTING, NEEDLE WORK, ETC.

CLASS 50.—PAINTINGS AND SCULPTURE.

Composition landscape in oil—Miss Ellen Titus, Jackson, 1st premium.....	\$5 00
Nettie Fisk, Jackson, 2d premium.....	3 00
Landscape from nature, in oil—Mrs. John Peabody, Hanover, 1st premium.....	3 00
Rosetta Oppenheim, Jackson, 2d premium.....	2 00
Animal piece—from life, Miss K. Hasbrook, Jackson, 2d premium.....	2 00
Bird piece, in oil, by exhibitor—Miss K. Hasbrook, 2d premium.....	2 00
Mrs. Peabody, Hanover, 3d premium.....	
Mrs. L. Eggleston, Jackson.....	Discretionary
Fruit piece, in oil, by exhibitor—Miss Ellen Titus, Jackson, 1st premium.....	\$2 00
Mrs. John Peabody, 2d premium.....	1 00
Portrait, from life, large size, in oil—A. O. Revenaugh, Jackson, 1st premium.....	5 00
Mrs. John Peabody, 2d premium.....	3 00
Portrait, from life, cabinet size, in oil—Mrs. John Peabody, 2d premium.....	2 00
Fancy painting, in oil, by exhibitor—Belle McNaughton, Jackson, 1st premium.....	3 00
Miss Ellen Titus, 2d premium.....	2 00

Oil painting, by person under sixteen years—Kate Robinson, Jackson, 1st premium.....	\$3 00
Miss K. Hasbrook, 2d premium.....	2 00
Historical painting, shown by any person—Mrs. H. A. Hayden, Jackson, 1st premium.....	2 00
Landscape painting, shown by any person—N. Gilbert, Jackson, 1st premium.....	2 00
Portrait, in oil, shown by any person—"Mrs. Peale," A. O. Revenaugh, 1st premium.....	2 00
Rosetta Oppenheim, 2d premium.....	1 00
Other paintings in oil—"Raphael's Madonna," Mrs. M. A. McNaughton, Jackson, 1st premium.....	2 00
Belle McNaughton, 2d premium.....	1 00
Water color paintings, by any person—M. Gilbert, Jackson, 1st premium.....	2 00
Collection of oil paintings, five in number, Mrs. M. A. McNaughton, 1st premium.....	5 00
Same, six in number—P. A. Sutton, Jackson, 2d premium.....	3 00
Collection of water color paintings and chromos—Mrs. H. M. Van Voorhels Jackson, 1st premium.....	3 00
Mrs. S. A. Fay, Detroit, 2d premium.....	2 00
Pastel painting of animal—Mrs. Chas. Benedict, Jackson, 1st premium.....	2 00
Pastel painting of landscape—Mrs. L. Eggleston, 1st premium.....	2 00
Pastel painting of fruit—Mrs. Chas. Benedict, 2d premium.....	2 00
Crayon drawing of face—M. Gilbert, 1st premium.....	2 00
Perry Averill, Jackson, 2d premium.....	1 00
Collection of photographs by any person—O. Mulvey, Jackson, 1st premium.....	3 00
Diploma and	
Landscape photograph—O. Mulvey, 2d premium.....	1 00
Engraving, steel plate—Belle McNaughton, 1st premium.....	3 00
R. McQueen, Jackson, 2d premium.....	2 00
Pencil drawing of animal—Claris Arnold, Charlotte, 1st premium.....	2 00
Pencil drawing, by girl under fourteen years—Mrs. L. Eggleston, 1st premium.....	2 00
Miss K. Hasbrook, 2d premium.....	1 00
Specimen architectural drawing—L. D. Grosvenor, Jackson, 1st premium.....	3 00
Practical penmanship, by gentleman—W. A. Reynolds, Jackson, 1st premium.....	2 00
I. E. White, Kalamazoo, 2d premium.....	1 00
Specimen penmanship, by girl under 15 years—Wm. Clapp, Stoney Point, 1st premium.....	3 00
Sample of etching on glass—D. V. Kern, Adrian, 1st premium.....	-----
H. E. Southworth, Jackson, 2d premium.....	-----
Sample of gilding on glass—M. Richert, Jackson, 1st premium.....	2 00
Sign painting—M. Richert, 1st premium.....	3 00
Display gilt frames—Z. S. Moore, Jackson, 1st premium.....	Diploma
Collection of chromos, not less than ten in number—Z. S. Moore, 1st premium.....	Diploma and \$3 00
R. McQueen, 2d premium.....	2 00
Chromo landscape—Mrs. L. Eggleston, 1st premium.....	2 00
Z. S. Moore, 2d premium.....	1 00
Chromo portrait—L. L. Newman, Jackson, 1st premium.....	2 00
Z. S. Moore, 2d premium.....	1 00
Chromo of birds—Z. S. Moore, 1st premium.....	2 00
Chromo of fruit—R. McQueen, 1st premium.....	2 00
Z. S. Moore, 2d premium.....	1 00
Set stereoscopic views—Z. S. Moore, 1st premium.....	2 00
Brown & Pitcher, Jackson, 2d premium.....	1 00
Composition in oil—"Aurora," Mrs. H. A. Hayden, Jackson, 1st premium.....	Discretionary
Fruit and game piece in oil—Mrs. H. A. Hayden, 1st premium.....	Discretionary
Piece statuary—"Morning," Mrs. H. A. Hayden, 1st premium.....	Discretionary
Flower piece, in oil—Mrs. H. A. Hayden, 1st premium.....	Discretionary
Mrs. H. A. Hayden, 2d premium.....	Discretionary
Bust, statuary—Mrs. H. A. Hayden, 2d premium.....	Discretionary
Sample of walnut frame—Z. S. Moore, 1st premium.....	Discretionary
Book of drawing, done by exhibitor—Miss K. Hasbrook, 1st premium.....	Discretionary
Collection of ink and pencil drawings—Frank Higgins, Jackson, 1st premium.....	Discretionary
	H. G. WELLS,
	A. W. NIMS,
	Committee.

CLASS 51.—PHILOSOPHICAL, SURGICAL AND OTHER INSTRUMENTS AND APPARATUS.

Specimens of artificial teeth—G. E. Holcomb, Jackson, 1st premium.....	Diploma
Set dental instruments—G. E. Holcomb, 1st premium.....	Diploma
Set of artificial teeth on gold—G. E. Holcomb, 1st premium.....	Diploma
Display of artificial teeth on rubber—G. E. Holcomb, 1st premium.....	Diploma
Display of dental work—G. E. Holcomb, 1st premium.....	Diploma
Set globes, for school use—Brown & Pitcher, Jackson, 1st premium.....	Diploma
Display of medicinal drugs—Albert M. Todd, Nottawa, 1st premium.....	Diploma
Display of table cutlery—H. E. Southworth, Jackson, 1st premium.....	Diploma and \$2 00
Display of bronzes—H. E. Southworth, 1st premium.....	Diploma
Exhibition of fancy glass ware—H. E. Southworth, 1st premium.....	Diploma
Exhibition of French china—J. B. Timberlake, Jackson, 1st premium.....	
Exhibition of old ware replated—Jackson Plating Co., 1st premium.....	

P. SEATON,

M. WEBB.

Committee.

CLASS 53.—ARTICLES OF LADIES' DRESS.

Display of millinery goods—Richardson & Bolton, Jackson, 1st premium.....	\$5 00
Suit of under garments—Mrs. Alex Bush, Mason, 1st premium.....	3 00
Elva Crego, Jackson, 2d premium.....	2 00
Lady's boa, Russian sable—Holden & Tinker, Jackson, 1st premium.....	2 00
Smith & Mattison, Jackson, 2d premium.....	1 00
Pair lady's fur gloves—Smith & Mattison, 1st premium.....	2 00
Holden & Tinker, 2d premium.....	1 00
Lady's fur muff—Holden & Tinker, 1st premium.....	2 00
Smith & Mattison, 2d premium.....	1 00
Lady's fur sacque—Holden & Tinker, 1st premium.....	2 00
Display of fur goods—Smith & Mattison, 1st premium.....	Discretionary
Display ladies' sacques, seal, otter, etc.—Holden & Tinker, 1st premium.....	Discretionary
Display of children's furs—Holden & Tinker, 1st premium.....	Discretionary
Display of ladies' seal hats—Holden & Tinker, 1st premium.....	Discretionary
Display ladies' furs—Holden & Tinker, 1st premium.....	Discretionary
Display trimming furs—Holden & Tinker, 1st premium.....	Discretionary
Braided suit by hand—Mrs. H. Teller, Jackson, 1st premium.....	Discretionary
Display lung protectors—Mrs. Jane Culver, Adrian, 1st premium.....	Discretionary
Madam Gilson's self-fitting dress chart—A. A. Olds, Decatur, 1st premium.....	Discretionary

MRS. H. R. WOODBURY,

MRS. C. W. FRALICK,

M. CALDWELL,

Committee.

CLASS 54.—PLAIN NEEDLE AND MACHINE WORK.

Specimen plain needle work—Mrs. C. G. Hampton, Detroit, 1st premium.....	\$3 00
Fine shirt, hand made—Mrs. C. G. Hampton, Detroit, 1st premium.....	2 00
Mrs. C. A. Bristol, Mason, 2d premium.....	1 00
Fine skirt, hand made—F. Mulvey, Jackson, 1st premium.....	2 00
Mrs. Alex. Bush, Mason, 2d premium.....	1 00
Night dress, hand made—Abbie R. Davenport, Jackson, 1st premium.....	2 00
Pair plain handkerchiefs—Mrs. C. G. Hampton, 1st premium.....	1 00
Silk patchwork quilt, by hand—Miss Nellie Hungerford, Concord, 1st premium.....	3 00
Mrs. Dwight Merriman, Jackson, 2d premium.....	2 00
Worsted patchwork quilt, by hand—Mrs. T. H. Nisbet, Jackson, 2d premium.....	1 00
Plain white muslin quilt, by hand—P. A. Sutton, Jackson, 1st premium.....	2 00
Calico quilt, by hand—D. H. Ramsey, Jackson, 2d premium.....	1 00
Pair plain sheets, by hand—Mrs. C. G. Hampton, 1st premium.....	2 00
Mrs. James De Puy, Jackson, 2d premium.....	1 00
Pair plain pillow cases or covers—Mrs. R. M. Cook, Charlotte, 1st premium.....	2 00
Mrs. Dwight Merriman, 2d premium.....	1 00
Set pillow shams—Mrs. Van Voorheis, Jackson, 1st premium.....	2 00
Mrs. Fred Meyers, Jackson, 2d premium.....	1 00
Sample braiding, by hand—Maggie Maul Barry, Jackson, 1st premium.....	2 00
Sample plain sewing by girl 12 years—Mina Miller, Jackson, 1st premium.....	2 00

Darned stockings—Mina Miller, 1st premium.....	\$2 00
Geo. Chisholm, Marshall, 2d premium.....	1 00
Ironed shirt—Mrs. C. A. Bristol, Mason, 1st premium.....	2 00
Plain sewing by machine—Mrs. Alex. Bush, Mason, 1st premium.....	2 00
Mrs. R. M. Cook, 2d premium.....	1 00
Fine skirt by machine—F. Mulvey, 1st premium.....	2 00
Infant's dress and skirt by machine—Miss Celia Blackmer, Jackson, 1st premium.....	2 00
Bed quilt made and quilted by machine—Mrs. R. M. Cook, 1st premium.....	3 00
Quilt, log cabin pattern—Mrs. H. Teller, Jackson, 1st premium.....	---

MRS. S. K. HARTWELL,
MRS. JAMES BRACKMER,
MRS. ERASTUS PECK,

Committee.

K—CLASS 55.—EMBROIDERY AND ORNAMENTAL NEEDLE WORK.

Collection ornamental needle work—Mrs. L. Eggleston, Jackson, 1st premium.....	\$8 00
Mrs. D. F. Woodcock, Lansing, 2d premium.....	5 00
Specimen infant's embroidered dress, in cotton—Mrs. Geo. A. Ferguson, Jackson, 1st premium.....	2 00
Mrs. Geo. A. Ferguson, 2d premium.....	1 00
Specimen embroidered pillow cases, in cotton—Mrs. M. Johnson, Jackson, 1st premium.....	2 00
Specimen embroidered lace cape, by hand—Addie Higgins, Jackson, 1st premium.....	2 00
Specimen embroidered lace curtains—Camp, Morrill & Camp, Jackson.....	Recommend
Specimen embroidered letters in marking, in cotton—Mrs. Geo. A. Ferguson, 1st premium.....	\$1 00
Specimen infant's skirt, in silk—Mrs. D. J. Robinson, Jackson, 1st premium.....	2 00
Mrs. D. J. Robinson, 2d premium.....	1 00
Specimen infant's blanket, in silk—Mrs. D. J. Robinson, 1st premium.....	2 00
Mrs. L. Eggleston, 2d premium.....	1 00
Specimen embroidered table cover, in silk—Mrs. D. F. Woodcock, 1st premium.....	2 00
Specimen embroidered lady's robe—Mrs. D. J. Robinson, 1st premium.....	2 00
Specimen chenille embroidery in silk—Mrs. D. J. Robinson, 1st premium.....	2 00
Mrs. L. Eggleston, 2d premium.....	1 00
Sample pictures worked in worsted—Mrs. L. Eggleston, 1st premium.....	3 00
Mrs. B. M. Davis, Jackson, 2d premium.....	2 00
Sample raised work, in worsted—M. L. Eggleston, 1st premium.....	2 00
Maggie Norris, Jackson, 2d premium.....	1 00
Pair toilet mats in worsted—Mrs. D. F. Woodcock, Lansing, 1st premium.....	2 00
Pair lamp mats in worsted—Mrs. D. F. Woodcock, 1st premium.....	2 00
Elva Crego, Jackson, 2d premium.....	1 00
Toilet cushion, in worsted—Mrs. D. F. Woodcock, 1st premium.....	2 00
Ottoman cover, in worsted—Mrs. D. F. Woodcock, 1st premium.....	2 00
Chair cover, in worsted—Mrs. E. N. Holcomb, Jackson, 1st premium.....	2 00
Belle McNaughton, Jackson, 2d premium.....	1 00
Georgie Gale, Jackson.....	Discretionary
Embroidered sofa cover, in worsted—Belle McNaughton, 1st premium.....	\$2 00
F. Mulvey, Jackson, 2d premium.....	1 00
Work on perforated board, in worsted—Mrs. Mary Swidensky, Jackson, 1st premium.....	2 00
Work on perforated board, card case—Mrs. Fred Meyer, 1st premium.....	2 00
Work on perforated board, match holder—Mrs. Fred Meyer.....	Discretionary
Work on perforated board, silk scent satchel—E. J. Smith, Francisco.....	Discretionary
Work on perforated board, motto—E. J. Smith.....	Discretionary
Chair tidy, in worsted—Nettie W. Merriman, 1st premium.....	\$2 00
Mrs. Fred Meyer, 2d premium.....	1 00
Mrs. Chancey Pickett, Jackson.....	Discretionary
G. C. Draper, Jackson.....	Discretionary
Embroidered towel rack—Mrs. D. F. Woodcock, 1st premium.....	\$2 00
Embroidered bracket—Belle Gillespie, Jackson, 1st premium.....	2 00
Mrs. D. F. Woodcock, 2d premium.....	1 00
Georgie Gale.....	Discretionary

Embroidered wall basket—Mrs. D. F. Woodcock, 2d premium.....	\$1 00
Lace work handkerchief—Mrs. Dwight Merriman, 1st premium.....	Discretionary
Lace work end for necktie—Mrs. Dwight Merriman.....	Discretionary
Chenille embroidery—Mrs. D. J. Robinson, Jackson, 1st premium.....	.....
Chenille embroidery, sofa pillow—Mrs. D. J. Robinson, 1st premium.....	.....
Slipper case—Mrs. D. J. Robinson, 1st premium.....	.....
Toilet cushion—Mrs. D. J. Robinson, 1st premium.....	.....
Embroidered hat rack—Mrs. D. F. Woodcock.....	Discretionary
Knit tidy, linen—Miss Ida Hanan, Jackson, 1st premium.....	.....
Embroidery in worsted—Miss Ida Hanan, 1st premium.....	.....
Sofa cushion, silk and worsted—Miss Ida Hanan, 1st premium.....	.....
Embroidered bed-spread, by lady 84 years old—Mrs. Phoebe Root, Plymouth, 1st premium.....	.....
Lace ends for neck-tie, point lace—Mrs. M. M. Wells, Jackson, 1st premium...	.....
Slipper case—Elva Crego, 1st premium.....	.....
Embroidered sofa pillow in worsted—Mrs. Jane Culver, Adrian, 1st premium.....	.....
Embroidered Centennial motto in silk—Mrs. Jane Culver, 1st premium, discretionary	.....
Embroidered Masonic emblem in silk flowers—Mrs. G. Ferguson, Jackson, 1st premium.....	.....
Point lace by exhibitor—Mrs. Burton, Jackson, 1st premium.....	.....
Lace work, infant's dress, etc.—Maggie Maud Barry, 1st premium.....	.....
Silk embroidery, sacque—Mrs. E. Brownson, Jackson, 1st premium.....	.....
Sofa pillow—Mrs. H. A. Hayden, 1st premium.....	.....
Chair—Mrs. H. A. Hayden, 1st premium.....	.....
Black lace chatelaine and barb—Mary Spaulding, 1st premium.....	.....
MRS. NELLIE O'BRIEN, MRS. E. B. GRIFFITH, and KATE GRIFFITH, <i>Committee.</i>	

CLASS 56.—CROCHET, KNIT, AND FANCY WORK.

Gents' scarf—Mrs. M. Balcom, Gull Lake, 1st premium.....	\$2 00
C. L. Lincoln, Greenville, 2d premium.....	1 00
Boy's scarf—Nellie W. Merriman, Jackson, 1st premium.....	1 00
Afghan robe, by girl 12 years old—Nellie Hungerford, Concord, 1st premium.....	Disc. 2 00
Afghan robe—Mrs. M. M. Wells, Jackson, 1st premium.....	3 00
Charles Tucker, Concord, 2d premium.....	2 00
Child's afghan robe, embroidered—Carrie Choate, Jackson, 1st premium.....	2 00
Cotton tidy crotchet—Mrs. J. S. Robinson, Jackson, 1st premium.....	2 00
Mrs. D. F. Woodcock, Lansing.....	Discretionary
One worsted tidy, embroidered—Mrs. D. F. Woodcock, Lansing, 1st premium.....	\$2 00
Crotchet tidy—Miss Ettie A. Holcomb, 7 years old, Lansing, 1st premium...	2 00
One worsted tidy—Mrs. B. M. Davis, Jackson, 2d premium.....	1 00
Set crotchet toilet mats—Mr. E. N. Holcomb, Jackson, 1st premium.....	2 00
Nellie W. Merriman, Jackson, 2d premium.....	1 00
Hair crotchet lamp mats—Miss Nellie Hungerford, Concord, 1st premium.....	2 00
W. A. Holcomb, Francisco, 2d premium.....	1 00
Crotchet or knit bed spread—Nellie Jenkins, Jackson, 1st premium.....	2 00
Mrs. N. Haught, Jackson, 2d premium.....	1 00
Knit flag—Mrs. D. Merriman, Jackson, 1st premium.....	2 00
Crotchet lady's sacque—Georgie Gale, Jackson, 1st premium.....	2 00
Pair knit leggins—Miss Minnie De Puy, Jackson, 2d premium.....	1 00
Pair knit fancy mittens—Mrs. Richard Elliott, Lansing, 1st premium.....	2 00
Fancy pin cushion—Myra C. Smith, Rives Junction, 1st premium.....	1 00
Mrs. Dr. Chittock, Jackson, 2d premium.....	1 00
Pen wiper—Nellie Merriman, Jackson, 1st premium.....	1 00
Fancy bear cushion—Belle Gillespie, Jackson, 1st premium.....	1 00
Mrs. M. M. Wells, Jackson, 2d premium.....	50
Fancy bead book mark—Kate Robinson, Jackson, 1st premium.....	1 00
Bead parasol (Mosaic work)—Nellie W. Merriman, Jackson.....	Discretionary
Knit pudding dish cover, Mrs. Ira Skinner, Jackson.....	Discretionary
Watch case—F. R. Lincoln, Greenville.....	Discretionary
Pin picture—Mrs. Dr. Chittock, Jackson.....	Discretionary
Knit silk suspenders—F. Mulrey, Jackson.....	Discretionary
Two crochet collars—F. Mulrey, Jackson.....	Discretionary

Cotton and worsted tidy—Mrs. Lama Snow, Spring Arbor.....	Discretionary
Set table mats—Mrs. L. Eggleston, Jackson.....	Discretionary
Cotton tidy, knit—Charles Benedict, Jackson.....	Discretionary
Cotton tidy—Mrs. R. B. Turner.....	Discretionary

MRS. H. A. HAYDEN,
MRS. O. LIVERMORE,
MISS ELLA FLETCHER,

Committee.

CLASS 57.—PAINTING, NEEDLE WORK, ETC.

Hair wreath—Mrs. Chas. Benedict, Jackson, 1st premium.....	\$2 00
Mrs. Dr. Chittock, Jackson, 2d premium.....	1 00
Display wax work—Miss Ella Mills, Jackson, 1st premium.....	3 00
Mrs. Allen Drake, 1st premium.....	3 00
Miss Annie Ambers, Jackson, 2d premium.....	2 00
Mrs. E. N. Holcomb, Jackson, 2d premium.....	2 00
Display wax flowers—Elva Crego, Jackson, 1st premium.....	2 00
Mrs. Allen Drake, Jackson, 1st premium.....	2 00
Miss Ella Mills, Jackson, 2d premium.....	1 00
Display wax fruit—Miss Nettie Fisk, Jackson, 1st premium.....	3 00
Artificial feather flowers—Mina Miller, Jackson, 2d premium.....	1 00
Specimen worsted flowers, solid—Mrs. G. Ferguson, Jackson, 1st premium...	2 00
Abbie R. Davenport, Jackson, 2d premium.....	1 00
Mrs. R. B. Turner, Jackson.....	Discretionary
Ornamental shell work—Mrs. L. Eggleston, Jackson, 1st premium.....	\$2 00
Wreath dried grasses and plants—Nellie E. Jenkins Jackson, 2d premium....	1 00
Display horn combs—Detroit Comb Manufacturing Company, Detroit.....	Discretionary
Wreath skeleton flowers—Mrs. Dr. Chittock, Jackson.....	Discretionary
Bouquet fern leaves—Mrs. Dr. Chittock, Jackson.....	Discretionary
Feather fans from home birds—Dwight Merriman, Jackson.....	Discretionary
Book autumn leaves—Dwight Merriman, Jackson.....	Discretionary
Coal shells—Mrs. L. Eggleston, Jackson.....	Discretionary

MRS. JOHN DREW,
MISS NELLIE O'BRIEN,
MRS. D. L. NEWCOMB,

Committee.

CLASS 58.—PRINTING AND STATIONERY.

Best local notice of fair of 1876—"Jackson Patriot," Jackson, 1st premium...	\$50 00
"Monroe Commercial," Monroe, 2d premium.....	30 00
"Saginaw Republican," East Saginaw, 3d premium.....	20 00
Specimen pamphlet printing—"Pontiac Gazette Company," Pontiac.....	Diploma

A. J. COOK,
HERMAN LOOMIS,
GEO. S. BURROWS,

Committee.

CLASS 59.—MISCELLANEOUS ARTICLES.

Work on marble—Avery, Patterson & Co., Detroit, 1st premium.....	Diploma and \$50 00
Fire brick—Jackson Fire Clay Co., Jackson.....	Diploma
Building stone—S. Gregory & Co., Stony Point.....	Diploma
Specimen superphosphate fertilizer—Casper Schulte, Detroit.....	Diploma
Ground bone—Jarves & Hooper, Detroit, 1st premium.....	\$3 00
Prepared drain—Jackson Fire Clay Co., Jackson, 1st premium.....	10 00
Specimen artificial stone, C. W. Sterns, Jackson.....	Diploma
Brick by machinery—A. J. Geer, Somerset.....	Diploma
Mineral paint John H. Dougherty, Detroit.....	Diploma
Sample sewer pipe—Jackson Fire Clay Co., Jackson.....	Discretionary
Drain tile—Jackson Fire Clay Co., Jackson.....	Discretionary
Specimen Maine granite—Avery, Patterson & Co., Detroit.....	Diploma
Specimen files and rasps, hand make—Huson & Smith, Jackson, excellent.....	Discretionary
Display of horse shoes, hand made—J. E. Woodruff, Jackson, very fine.....	Discretionary
Farm bells—Luck & Co., Jackson.....	Diploma
Horse shoe nails—Globe Horse Nail Co., Boston, Mass.....	Worthy of commendation

The undersigned Committee on Premiums under division K, class 58, article best local notice of coming fair of 1876, after an examination of the articles entered for

competition under above head do award premiums as follows: First premium "Jackson Patriot," No. 382. Second premium to the "Monroe Commercial," No. 384. Third premium to the "Saginaw Republican," No. 383. The committee would favorably notice the "Ingham County Democrat," in particular, and other journals not named as being entitled to the thanks of the Society for their favorable notice and influence in placing the merits of the State fair of 1876 before the public and conducing to its success.

GEO. S. BURROWS,
HERMAN LOOMIS,
A. J. COOK,

Committee.

DIVISION L—CLASS 59.—MISCELLANEOUS ARTICLES.

Collection of handles and spokes—M. G. Terry, Monroe.....	Discretionary
Display of coopering tools—Warner & Dodge, Jackson.....	Diploma
Collection of kindergarten work and material—Mrs. Della Gardner, Jackson.....	Diploma
Display wire baskets for family use—N. Davis, Ida.....	Discretionary
Hanging basket and urn—Mrs. R. E. Brundage, Jackson.....	Commended
Pine mouldings—H. B. Fry, Leslie.....	Diploma
Wrought iron burial case—John Gilbert, Ypsilanti.....	Commended
Door and door hanging—H. J. Pearsall, Ypsilanti.....	Diploma
Barrel cover—George Welch, Marshall.....	Commended

D. W. GREEN,
C. PALMER,

Committee.

DIVISION M—CLASS CENTENNIAL.—SPECIMENS NATURAL HISTORY.

Largest and best collection of stuffed birds—F. L. Reese, Jackson, 1st premium.....	\$10 00
Mrs. D. Eggleston, Jackson, 2d premium.....	5 00
Prof. E. H. Crane, Colon.....	Silver Medal
Single specimen stuffed bird—Mrs. L. Eggleston, Jackson.....	Mentioned
Two antelopes' heads stuffed—F. N. Wood, Jackson.....	Mentioned
Two elks' heads stuffed—F. N. Wood, Jackson.....	To be honorably mentioned
Display of insects—Mrs. L. Eggleston, Jackson.....	To be honorably mentioned
Display of insects named and classed—Detroit Scientific Association, Detroit.....	Diploma
Collection of fossils—G. L. Garrett, Sandstone.....	To be noticed
Venus coral—Mrs. D. Merriman, Jackson.....	To be mentioned
Black coral—Mrs. D. Merriman, Jackson.....	Worthy of mention
Specimen of fossil—Mrs. L. Eggleston, Jackson.....	Mentioned
Venus flower basket—Dr. J. L. Mitchell, Jackson.....	Worthy of mention
Collection of natural curiosities—Bessie Robinson.....	Silver medal
Mrs. L. Eggleston.....	Silver medal
Collection mineralogy—Prof. E. H. Crane, Colon.....	Diploma
Skin of gopher snake—Miss Pamela Smith, Monroe.....	
Skin of King snake, Florida—Miss Pamela Smith, Monroe.....	
Specimen of rock from Gibraltar, Spain—Miss Pamela Smith, Monroe.....	
Lava from Mt. Vesuvius—Miss Pamela Smith, Monroe.....	
Sea horse from Florida coast—.....	Very interesting collection to be mentioned
Indian feather cape—Mrs. D. Merriman, Jackson.....	Worthy of mention
Feather head dress of Sioux warrior—Joseph Wicksawba, Grand Haven.....	Worthy of mention
Specimen illustration of colonial times, warming pan—Mrs. Ira Skinner, Jackson.....	To be mentioned
Ancient yarn-winder—Mrs. Charles Benedict, Jackson.....	Worthy of mention
Paper containing Washington's farewell address—Mrs. Chas. Benedict, Jackson.....	Worthy of mention
Plan of the city of New York, survey 1728—Mrs. Dr. Chittcock, Jackson.....	Honorable mention
Double carpet coverlid, made in 1830—Mrs. Brundage, Jackson.....	Noticed
Linen Shirt worn in 1826—Mrs. Brundage, Jackson.....	Noticed
Col. Ethan Allen's sword of Ticonderoga fame—Mrs. Emma C. Hopkins, Spring Lake.....	
Sword belt.....	
Breast plate.....	Worthy of record
Collection of articles and curiosities—G. L. Garrett, Sandstone.....	To be mentioned

Specimen Indian relics, basket and idol—B. M. Davis, Jackson.....To be mentioned
 Indian head dress, arrow heads, peace pipe—Miss Pamela Smith, Monroe.....To be mentioned

Scalping knife, rattle used in war dance.....
 Crown and ear rings.....
 Snow shoes.....
 Silver crown for squaw.....

Received premium of \$25 on total collection
 Collection ancient coins and currency—J. J. Duer, Jackson.....Silver Medal
 Silver Danish coin 100 years old—Martin Johnson, Grand Haven.....Mention
 Ancient book—Martin Johnson, Grand Haven.....Mention
 Paraphrase of psalms—Mrs. D. Merriman, Jackson.....Worthy of mention
 Article illustrating education in ancient times—M. L. Fowler, Jackson.....

Worthy of mention
 Ancient sugar bowl, cup and saucer—Mrs. M. Johnson, Jackson.....Mention
 Article illustrating early hand sewing machine—Willis Johnson, Reading.....Mention
 Full dress Esquimaux girl—Martin Johnson, Grand Haven.....Mention
 Latin book published 1602—Charles F. Pagleson, Grand Haven.....Mention
 Warming pan 100 years old—G. L. Garrett, Standstone.....Mention
 Article of curiosity, coat of arms—H. B. Fry, Leslie.....Mention
 Latin works of Diogenes, 2 vols., 1512; Latin works Cyprianus, 1521; Latin works Theophylactus, 1524; Latin works Thomas Waldenses, 3 vols., 1571; James Eustachius Bonaventura, 2 vols., 1572; Dionysius de Quatuor hominis novissimus, 1 vol., 1578; Missale Romanum (mass book), 1598; Ste. Augustine Opuscula quondam selecta, 1673—Father Buyce, Jackson.....

Very rare collection, should be very carefully mentioned
 Relics of late war, knives, rebel flag, canteen—B. M. Davis, Jackson, worthy of mention
 Gen. Smith's sword and belt, battle flag captured by Gen. Smith—Miss Pamela Smith, Monroe.....Worthy of mention

Whaling harpoon (been in service), sperm whale tooth, South Sea Island weapon, collection various minerals, case specimens and curiosities—J. J. Duer, Jackson.....Worthy commendation

Buckskin hunting shirt and trappings, chief's calumet pipe and stem, pair embroidered leggings, quiver and arrows, embroidered gun case, tobacco pouch, battle shield, pair elk antlers, chief's head dress and case, pair princes' leggings and moccasins, chief's ornaments, two pairs squaws' leggings and moccasins, and two buckskin aprons—Custer National Monument Association, Monroe.....Recommended discretionary premium \$100 00

Collection Centennial curiosities—H. A. Wetmore, Concord.....Discretionary premium 5 00

Spanish McCarty or hair rope—C. Draper, Jackson.....To be mentioned

Relic of Chicago fire—Peter Mulvany, Marengo.....A good specimen

Specimens from Mexico; spurs, three relics Mexican armor, idol, Australian riding whip, miner's axe badge used in Mexico, sword of Mexican general, stuffed deer—Miss Pamela Smith, Monroe.....Recommended diploma

Scalp dress, Sioux jacket, buffalo robe hood, beaded buckskin dress, pair Comanche moccasins, Comanche haversack and water bottle, Indian saddle, section Comanche tent, two war shields and quivers, 17 war arrows—Audubon Club Detroit, 1st premium.....Diploma

Biblia Sacra (Holy Bible), 1692; French works—Proves de Messire de Claude, folio, 6 vols., 1695, Oeuvres choisis de Messire de Claude, folio, 1 vol., 1696; Flemish works—Plinius secundus, Des Wyd Vermarden Nitturer Kundigen, 1770—Father Buyce.....Worthy of commendation

Tools from Herculaneum—Miss Pamela Smith, Monroe.....To be mentioned

The undersigned committee in this department have carefully examined the large and very interesting collections and specimens of natural history and relics, ancient and curious, that were on exhibition, and although not recommending many premiums in money, will in their report to the executive committee, speak of and notice the various entries.

J. WEBSTER CHILDS,
 WM. L. WEBBER, and
 WM. M. FERRY,
Committee.

SUMMARY of Entries, Premiums offered, and Premiums awarded at State Fair 1876.

	PREMIUMS.							
	Offered.				Awarded.			
	Ent.	Money.	Dip.	Medal.	Money.	Dip.	Medal.	
Division A—Cattle.....	252	\$2,257	7	--	\$1,692	7	--	
Division B—Horses.....	335	4,136	--	--	3,562	--	--	
Division C—Sheep and swine.....	258	915	--	--	875	--	--	
Division D—Poultry.....	187	292	--	--	144	--	--	
Division E—Farm products.....	312	782	11	1	586	5	1	
Division F—Farm implements.....	317	623	44	10	520	19	5	
Division G—Vehicles.....	50	225	11	--	125	8	--	
Division H—Machinery.....	106	--	40	28	--	9	7	
Division I—Manufactures.....	153	413.50	41	10	105.50	37	6	
Division J—Musical instruments and sewing machines.....	13	--	--	--	--	--	--	
Division K—Painting, needlework, and art generally.....	458	851	67	--	427	13	--	
Division L—Miscellaneous.....	31	77	26	5	18	13	--	
Division M—Centennial department..	127	15	--	--	145	3	4	
Totals.....	2,599	\$10,471.50	247	54	\$8,199.50	107	23	

FINANCIAL EXHIBIT.

The following is a detailed statement of the expenditures, embracing all business orders drawn and appropriations made during the current year, giving number and amount of each order and for what drawn, and in whose favor:

No. Voucher.	For Whom.	For What.	Amount.
1.	C. F. Kimball, Pontiac.....	Stationery for office.....	\$3 75
		Postage.....	2 70
		Incidental expenses.....	3 75
			<hr/>
			\$10 20
2.	A. J. Dean, Adrian.....	Executive Committee expenses.....	158 45
3.	E. O. Humphrey, Kalamazoo.....	Expense.....	37 94
4.	Russell House, Detroit.....	Hotel bill Ex. Com., winter meet'g	250 92
5.	E. O. Humphrey, President.....	Centennial appropriation.....	250 00
6.	State Pomological Society.....	Appropriation.....	300 00
7.	C. F. Kimball, Pontiac.....	Postage.....	\$6 00
		Express, fr't, & telegraph..	10 66
			<hr/>
			16 66
8.	A. E. Allison & Co., Pontiac.....	Medal account, engraving medals..	23 00
9.	C. F. Kimball, Secretary.....	Salary first quarter, 1876.....	250 00
10.	E. O. Humphrey.....	Locating Committee expense.....	116 35
11.	Monroe Commercial.....	Office stationery.....	10 50
12.	Michigan Farmer.....	Printing circulars.....	\$25 00
		Adv. horse premiums.....	25 00
			<hr/>
			50 00
13.	J. M. Sterling.....	Executive Committee expenses.....	15 45
14.	E. O. Humphrey.....	Centennial appropriation.....	500 00
15.	State Pomological Society.....	Appropriation.....	300 00
16.	C. L. Whitney.....	Executive Committee expense.....	11 60
17.	J. Webster Childs.....	Executive Committee expense.....	7 55
18.	Wm. M. Ferry.....	Executive Committee expense.....	13 40
19.	Wm. L. Webber.....	Executive Committee expense.....	2 66
20.	C. F. Kimball.....	Salary second quarter, 1876.....	250 00
21.	C. F. Kimball.....	Express, fr't, & telegraph..	\$4 43
		Postage stamps.....	10 00
			<hr/>
			14 43
22.	Pontiac Gazette Co.....	Printing 6,000 premium lists.....	360 00
23.	Russell House, Detroit.....	Business Committee expense.....	12 41

No. Voucher.	For Whom.	For What.	Amount.
24.	J. M. Sterling	Business Committee expense	\$12 85
25.	Kalamazoo Publishing Co.	Printing State Fair posters	205 00
26.	J. M. Sterling	Lumber, Jackson	260 00
27.	D. B. Lincoln	Labor account, hauling lumber	16 25
28.	C. F. Kimball	Salary third quarter, 1876	250 00
29.	Pontiac Postoffice	Postage	25 12
30.	Pontiac Gazette Co.	Miscellaneous printing	47 65
31.	Carlton & Van Antwerp, Jackson	Miscellaneous printing for fair	37 85
32.	James O'Donnell, Jackson	Miscellaneous printing for fair	36 05
33.	Peter O. Voorheis, Grand Rapids	Secretary's clerk hire	30 30
34.	Brown & Pilcher, Jackson	Office stationery	11 71
35.	Brown & Pilcher, Jackson	Deferred bill of 1869	20 40
36.	J. Webster Childs	Ex. Com. expense	\$15 35
		Marshall and police	15 00
			30 35
37.	R. G. Hart, Lapeer	Executive Committee expense	17 20
38.	D. B. Lincoln, Jackson	Labor hauling sand and cinders	16 00
39.	D. B. Lincoln, Jackson	Labor hauling evergreens	6 00
40.	Gould, Bro. & Dibble	Fountain fixtures	6 50
41.	D. B. Lincoln	Labor hauling lumber	6 50
42.	A. O. Hyde	Ex. Com., expense paid for posting bills, traveling expense, etc.	8 50
43.	Mr. Marshall	Marshal and police	4 00
44.	H. O. Hanford	Executive Committee expense	5 60
45.	First Baptist, Jackson	Meal tickets account	184 66
46.	W. M. Bennett & Son, Jackson	State Fair expense	5 45
47.	J. Q. A. Burrington	Executive Committee expense	14 25
48.	J. G. Ramsdell	Ex. Com. expense	\$13 25
		Labor account	3 50
			16 75
49.	C. F. Kimball	Secretary's clerk hire expense	342 64
50.	Frank Maynard, Jackson	Forage	136 00
51.	Jackson Foundry & Machine Co.	Steam power for State Fair	475 00
52.	C. L. Soper, Flint	Services as marshal	26 00
53.	Thos. Sackrider	Forage	195 40
54.	Central City Band, Jackson	Music for fair	132 00
55.	Bennett & Woods, Jackson	Lumber	193 13
56.	F. M. Manning, Paw Paw	Three cars evergreens	\$75 00
		Labor trimming Art Hall	33 50
			108 50
57.	W. U. Tel. Co., J. G. Hull, Agt.	Agent telegraphing	8 69
58.	Abel Angel	Executive Committee expense	6 35
59.	O. S. Gully	Printing State Fair tickets and cer- tificates	46 27
60.	E. W. Rising	Executive Committee expense	9 40
61.	C. E. Pierce	Forage, hay	128 05
62.	D. B. Lincoln, Jackson	Labor hauling lumber, etc.	19 00
63.	Geo. H. Gale, Jackson	Ex. Com. expense, livery	7 50
64.	Morris Knapp, Jackson	Ex. Com. expense, livery	61 00
65.	Meredith Green	Marshal and police	10 00
66.	Thos. E. Camburn	Marshal and police	21 00
67.	C. L. Whitney	Executive Committee expense	12 82
68.	H. Dale Adams	State Pomological Society	500 00
69.	Geo. W. Phillips	Executive Committee expense	12 40
70.	C. F. Kimball	Incidental expenses for telegraph, express, premium ribbons, etc.	55 37
71.	Lewis Pike, Jackson	Use of barn for horse department	24 00
72.	E. Dennis, Jackson	Ton of coal for trial engine	3 50
73.	C. L. Mitchell, Jackson	Use of booth ground	25 00
74.	A. L. Thayer	Keeping State Fair horses	18 75
75.	Michigan Farmer	Advertising State Fair	25 00
76.	Pratt & Gibson, Jackson	Fountain fixtures	1 50
77.	W. M. Palmer, Jackson	Labor on ground	2 00
78.	Mrs. Derby, Jackson	Superintending ladies' room	20 00

No. Voucher.	For Whom.	For What.	Amount.
79.	C. P. Ociens, Jonesville	Ft. W., J. & S. freight refunded	\$3 60
80.	H. R. Barker, Jonesville	Ft. W., J. & S. freight refunded	4 75
81.	John D. Walker & Co., Detroit	Posting bills	2 42
92.	Chas. Proudly, Marshall	Ft. W., J. & S. freight refunded	9 60
83.	J. Webster Childs	Executive Committee expense	13 00
84.	Hibbard House, Jackson	Executive Committee expense	6 50
85.	J. M. Sterling	Incidental expense	30 84
86.	E. Smead	Labor	5 00
87.	Moses Levi and others	Meal tickets	22 59
88.	A. J. Dean, Treasurer	Clerk hire, etc.	134 80
89.	Hibbard House, Jackson	Board of Executive Committee	134 00
90.	Smith & Hurd, Jackson	Board of Executive Committee	113 00
91.	A. A. Ballou & Co., Bay City	Lumber	91 20
92.	A. P. Chapman	Lunch room expense	139 06
93.	Hibbard House, Jackson	Executive Committee expense	207 50
94.	S. Heyser & Sons, Jackson	Lumber	8 55
95.	A. J. Dean	Incidental expense, express, telegraph, postage, engraving, and stationery	40 78
96.	Ira H. Butterfield	Viewing Committee expense	12 00
97.	F. M. Manning	Paid for labor, trimming hall	61 15
98.	John Murray, Ont.	Viewing Committee expense	30 00
99.	D. W. Howard	Executive Committee expense	15 30
100.	Times & Expositor, Adrian	Stationery and printing	36 50
101.	J. S. Hurd, Jackson	Labor, for hauling lumber	9 00
102.	Sterling & Dean, Marshall	Marshal and police	401 25
103.	Point Au Paix Wine Co.	Incidental expense	33 60
104.	Oliver Guyor, Monroe	Paid carpenters, laborers, and renting booths	593 00
105.	J. M. Sterling	Ex. Com. expense, Dean, Sterling, and Hyde	19 50
106.	Rice & McConnel Jackson	Nails and hardware	63 66
107.	J. W. Clark, Hanover	Ft. W., J. & S. freight refunded	2 80
108.	J. M. Sterling	Express and postage	5 75
109.	Smith & Hurd, Jackson	Executive Committee expense	8 00
110.	Parmelia Smith, Monroe	paid for goods lost	5 00
111.	E. Driggs, Adrian	M. S. R. R., freight refunded	9 28
112.	L. C. Lincoln, Greenville	J. L. & S., freight refunded	2 40
113.	Michigan Farmer	Publishing awards fair of 1876	100 00
114.	U. S. Mint	Medal account, 30 silver	154 85
115.	H. Dale Adams	Secretary Pomological Society, balance of appropriation	400 00
116.	C. F. Kimball	Secretary's salary, 4th quarter	250 00
117.	W. L. Webber	Executive Committee expense	4 67
118.	Mrs. Jas. Boulton	Lost cheese, fair 1875	10 00
119.	Pontiac Postoffice	Stamps	42 44
120.	Frank Maynard	Forage	15 00
121.	C. F. Kimball	Secretary's office rent year 1876	50 00
	Pomological appropriation to pay premiums		1,000 00
Total of business orders and appropriations expended			<u>\$11,166 51</u>

RECAPITULATION OF BUSINESS ORDERS AND APPROPRIATIONS.

Appropriation to Pomological Society for expenses	\$1,500 00
Appropriation to Pomological Society for premiums	1,000 00
Executive Committee expenses	1,053 70
Centennial fund used	750 00
Secretary's salary	1,000 00
Printing account	747 07
Carpenter and labor account	620 00
Lumber and building material account	617 38

Power for machinery hall.....	\$475 00
Marshal and police account.....	453 25
Forage account.....	474 45
Secretary and clerk hire.....	296 55
Meal ticket expense.....	207 25
Newspaper advertising.....	193 85
Team, hack, and livery account.....	185 20
Decorating halls.....	183 65
Medal account.....	177 85
Lunch room expense.....	144 96
Music for fair.....	132 00
Locating Committee expense.....	116 35
Treasurer's clerk hire.....	100 00
Board of employes.....	96 39
Business Committee expenses.....	70 15
Sundry expense account of fair.....	65 85
Expressage and posting bills.....	55 14
Postage account.....	94 12
Office stationery.....	42 99
Stable hire, horse department.....	42 75
Assistant superintendents—foreign committees.....	42 00
Treasurer's expense account.....	40 78
Refunded freight.....	32 43
Telegraph account.....	16 90
Badge and ribbon expense.....	14 85
Stationery bill, 1869.....	20 40
Rent of outside grounds.....	25 00
Printing Committee expense.....	9 75
Secretary's traveling expenses.....	6 25
Diploma account.....	2 25
Lost goods, 1875.....	10 00
Rent of Secretary's office.....	50 00
Total.....	<u>\$11,166 51</u>

GENERAL BALANCE, DEC. 19, 1876.

	DR.
To cash in treasury subject to order at last annual settlement, Dec. 21, 1875.....	\$5,338 36
To cash received by treasurer from all sources, including memberships sold by secretary.....	20,768 55
Total cash.....	<u>\$26,106 91</u>

	CR.
By paid Pomological appropriation expenses and premiums.....	\$2,500 00
By paid business orders less Pomological appropriation.....	8,666 51
By paid 49 premium checks awarded by Executive Committee on discretionary premiums, 1875, winter meeting.....	143 50
By paid 398 premium checks for premiums awarded at fair of 1876.....	8,201 50
	<u>\$19,511 51</u>

Dec. 19, 1876, balance in treasury to credit of the Society, and subject to order.....	\$6,595 40
	C. F. KIMBALL, <i>Secretary</i> .

REPORT OF THE FINANCE COMMITTEE.

The Committee on Finance to whom was referred the annual report of the Secretary, would respectfully report that they have carefully examined the same, and compared the stubs of business orders with the vouchers, and the vouchers with the register of business orders issued, as reported, and find the same correct. We have also compared the stubs of premium checks issued with the register of premiums awarded and paid and find them to agree, and correct. We have examined and find the financial balance of the Society as follows, as reported by the Secretary, to wit:

Cash on hand at commencement of fiscal year.....	\$5,338 36
Cash received by treasurer from all sources during year.....	20,768 55
Total.....	<u>\$26,106 91</u>

CONTRA.

Business orders issued during the year.....	\$10,166 51
Pomological appropriation paid by their premium checks drawn directly upon treasurer.....	1,000 00
Premium checks issued during year.....	8,345 00
	<u>\$19,511 51</u>

Balance in treasury Dec. 20, 1876, subject to draft by the Society.....	\$6,595 40
Signed.	

HENRY FRALICK,
E. W. RISING,
R. G. HART,
Finance Committee.

TREASURER'S REPORT.

Michigan State Agricultural Society in account with A. J. Dean, Treasurer, CR.

Dec. 21, 1875, By amount on hand on settlement this day.....	\$6,141 20
Sept. 22, 1876, By cash received for 36,105 whole admission tickets.....	18,052 50
2,112 half admission tickets.....	528 00
208 grand stand tickets.....	52 00
from J. M. Sterling, for booth rent.....	1,833 50
Geo. Buck, for checking baggage.....	23 15
Mr. Stuck, gate keeper.....	1 50
Bickford, gate keeper.....	4 00
Several gate tenders.....	6 40
H. O. Hanford.....	1 00
Frank Sterling, sale of mattress.....	1 50
December 11, 1876, J. M. Sterling, for lumber sold.....	265 00
	<u>\$26,909 75</u>

(1,507 membership tickets sold, which is included in the account of admission tickets.)

1876.	DR.
To paid old checks of 1874-5.....	
To paid premium checks of 1876.....	\$8,136 50
To paid business orders, 1876.....	10,463 93
To paid Pomological checks, 1876.....	991 05
To cash on hand to balance, 1876.....	7,318 27
	<u>\$26,909 75</u>

A. J. DEAN, *Treasurer.*

To the Michigan State Agricultural Society :

The undersigned, your Finance Committee, to whom was referred the foregoing account of the Treasurer of said Society, respectfully report that we have compared said account with the vouchers accompanying the same, and the stubs with the checks, and find them to agree, and the account correct.

Jackson, December 20, 1876.

HENRY FRALICK,
E. W. RISING,
R. G. HART,
Finance Committee.

BUSINESS COMMITTEE REPORT TO MICHIGAN STATE AGRICULTURAL SOCIETY, 1876.

Dec. 23, 1875.	
1. Old bills.....	\$101 54
2. Winter meeting, Detroit.....	409 37
	<u>\$510 91</u>

March, 1876.

3. Locating Committee.....	\$116 35	
4. Centennial department.....	13 60	
5. Constitutional Committee.....	35 21	
6. Business, printing, and transportation.....	52 47	217 63
7. Decorating halls.....	\$181 10	
8. Teaming and livery.....	96 00	
9. Water and fountain.....	11 50	
10. Carpenters, laborers, and renting booths.....	593 00	
11. Lumber and cartage same.....	610 07	
12. Hardware.....	63 66	
13. R. R. freight and storage.....	26 75	1,582 08
14. Machinery power and ground rent.....	\$500 00	
15. Printing.....	1,008 01	
16. Posting bills.....	10 92	1,518 93
17. Band and band wagon.....	\$132 00	
18. Viewing Committees.....	42 00	
19. Lunch room.....	139 06	
20. Meal tickets.....	213 75	
21. Hotel bills.....	462 50	
22. Forage and barn rent.....	524 70	
23. Ladies' waiting room.....	20 00	
24. Marshal's assistants.....	61 00	
25. Executive Committee's bills.....	171 26	
26. Police and gates.....	401 25	
27. Treasurer's office.....	134 80	
28. Secretary's office and salary.....	1,597 36	3,899 68
29. Medals for 1876.....		154 85
30. R. R. freight refunded exhibitor.....		32 43
31. Centennial Representative, Philadelphia.....		750 00
32. Pomological appropriation.....		1,500 00
Total expenses of fair proper.....		\$10,166 51
Lumber sold.....	\$265 00	
Received for booth rent.....	1,833 50	
		\$2,098 50

And money paid to the treasurer by J. M. Sterling, Chairman.

J. M. STERLING,
A. O. HYDE,
WM. L. WEBBER.

JACKSON, Mich., Dec. 20, 1876.

The undersigned Finance Committee of the Michigan State Agricultural Society report that they have compared the foregoing report with the register of orders issued, and the register with the vouchers, and find the same to agree, and to be correct.

HENRY FRALICK,
E. W. RISING,
R. G. HART,
Finance Committee.

SUPERINTENDENTS' REPORTS.

In accordance with a resolution of the Executive Committee, adopted at the winter meeting thereof in 1875, at Detroit, the following reports from Executive Superintendents of Departments at the late State Fair are submitted. The report of Judge Ramsdell upon Fine Art Department has not as yet been received.

DIVISION A—CATTLE.

To the President and Executive Committee of the State Agricultural Society:

The exhibition of cattle at the Fair of 1876 was large in numbers, far beyond the accommodations provided by the Society, and many of the exhibitors are entitled to much praise for the patience shown in waiting until suitable stalls were being provided for their use.

The whole number of entries of cattle were 238, as follows: Shorthorns, 102, by 26 exhibitors from nine counties; Devons, 22; Herefords, 11; Jerseys, 6; Ayrshires, 8; Galloways, 17; herds, 11; grade and native, 32; working cattle and steers, 16; fat cattle, 13.

In quality the cattle were above the average of previous years, showing much improvement in the stock of the State. The number of exhibitors also is on the increase, many young breeders having entered the lists, and I cannot but feel that much credit in this respect is due to the influence of this Society through its annual fairs.

It may seem invidious to mention the herds of exhibitors individually. I must say, however, that Messrs. Brooks, Uhl, Phelps Bros., Lessiter, and others are entitled to credit for the fine display of useful qualities in class of Shorthorns shown by them, while the Devons and Galloways of Mr. Hart, and the Ayrshires of Mr. Wilson of Ohio were superior in quality. The herd of Herefords of Mr. Clark of Ohio were first class, as may be proved by their taking the first prize as a herd over several first class herds of Shorthorns. And here I would recommend that the list of premiums on herds be amended so that only those of the same breed shall compete together, as the present arrangement cannot give satisfaction to exhibitors, and no committee feel competent to decide as to the merits of the different breeds when competing together for the same prize.

I would also recommend that in view of the great number of Shorthorns shown, and the increasing interest in this breed in the State, that a fourth premium be added to the list for this breed.

It is to be regretted that the cattle from the Agricultural College farm were not shown at the fair, since they have whenever exhibited added much to the interest of the exhibition.

I have to thank the several committees for their careful, painstaking, and in many cases difficult examinations in the several classes, and am happy to state that in general their decisions received the unanimous approval of exhibitors and spectators.

I think it would add much to the usefulness of the awards if all thoroughbred cattle were examined by the scale of points adopted by competent authorities as adapted to the several breeds. For list of awards I refer you to the reports of committees as published by the Secretary.

GEO. W. PHILLIPS,

Ex-Superintendent of Cattle, State Fair 1876.

DIVISION B—HORSES.

To the President and Executive Committee of the State Agricultural Society:

This is the first time that regular reports have been expected from the various departments embraced in our State Fair. While all of us are engaged in one general enterprise, our departments are separate and distinct from each other to a great extent. During the fair very little opportunity is afforded the various superintendents for visiting each other; consequently they know but little about the fair outside of their own duties. Hence we see the propriety of these reports. For the horse department we have but little to say. The new movement, or as it was termed by some the cutting out of the speed department from our horse exhibition, led a few people to say that our show of horses would be but a meager affair. However the superintendents soon found that the people were with us. On visiting among breeders, and occasionally calling upon horse owners, it was easy to discover a substantial friendly feeling towards the State Agricultural Society. As preparations for the fair were progressing, applications for room began to multiply, and before the fair opened a large share of our stable room was engaged. We had on the ground 192 double and 161 single stalls, making a total of 353 stalls. About 65 or 70 of the stalls upon the low ground in rear of the grand stand would be worthless except in very dry weather. Many applications from the city of Jackson, for stables on the ground, were from necessity declined. These applicants were very much surprised, as they supposed we had more room than we could use. When the great demand for stalls became apparent, they very kindly invited us to occupy all the spare room in their barns. This invitation we availed ourselves of to some extent.

Here let us say, that before and during the fair, we had many evidences of good feeling manifested towards the State Fair and its conductors, by the people of Jackson. There was exhibited before your committee 362 horses, classed in the following manner: roadsters, 68; thoroughbreds, 12; gentlemen's driving horses, 59; horses of all work, 67; breeders' special premiums, 43; carriage and buggy horses, 60; draft horses, 48; saddle horses, 5; total, 362. Also a small exhibition of jacks and mules. The exhibition spoke for itself, being pronounced by many old fair-goers, the best general horse exhibition they had ever witnessed.

We thank the exhibitors for their kind and gentlemanly behavior towards us from the beginning to the close of the fair. We need not speak of any individual exhibitions, they were all good.

We close by saying we had a pleasant time, feeling fully repaid for any effort we may have made, by the good feeling manifested by all interested, as well as by the spectators generally.

A. O. HYDE,
D. W. HOWARD,
Superintendents.

DIVISION C—SHEEP AND SWINE.

To the President and Executive Committee of the State Agricultural Society:

I did not expect to be called upon for a report, as it is expected that the chairman or first appointed will perform such duties, and the others assist him where needed; but a few days ago I received the entry books, with a request to make a report on classes 19, 20, 21, 22, and 23, and without any previous preparation I will submit the following:

In class 19, American merinoes, there was not a large show for a State like ours, but the quality was good. There were 35 entries, including 61 head; 18 prizes offered, 15 awarded, and one discretionary recommended. I think there has been some ill feeling by exhibitors that have shown in this department, on account of judges, and would suggest that there be a meeting of fine-wool breeders called, and let them choose the judges by a majority vote.

Class 20, middle wools, there was a good, and a large show. The breeders of this kind of sheep have been scattering, but probably are increasing. There were 36 entries, including 82 head, 18 prizes offered, all of which were awarded.

Class 21, long wools, there was a fine show, they taking the lead in numbers. Evidently, this kind of sheep are being better appreciated. There were 42 entries, including 87 numbers; same prizes offered, also awarded.

Class 22, fat sheep. Probably the change in the premium list brought out more, and a very creditable show; 30 being shown; 15 middle wools, and the same of long wools, making 10 entries, with 6 awards. If the premium list could be arranged so as to afford more money for this department, I would ask if it might not be best to offer premiums on grade ewes of the different classes. It would be likely to bring out another class of exhibitors. I believe that premiums should be offered on as great a variety as would add interest to the show, so as to pay as many as possible to help make it a success.

Class 23.—It is unnecessary for me to state that the exhibition of swine was the largest and finest ever made by this Society. Not in any other department have the people been educated as much, nor has there been so great an improvement noticeable as in this.

There were 38 entries of Berkshires, 15 prizes offered, and 13 awarded. Probably a mistake was made by the committee marking one or two premiums. Essex 30 entries, the same number of prizes offered, and all awarded; Suffolks 22 entries with 13 awards; large breeds, 31 entries, mostly Poland China, with 13 awards; fat hogs and pigs, 8 entries and 5 awards; miscellaneous entries 2, making 131 entries, consisting of 264 head. If I were to make any suggestion, it would be to offer a premium on a boar and sow over six months and under one year, and the four pigs to be under six months old.

AMOS F. WOOD.

DIVISION D—POULTRY.

To the President and Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN:—In compliance with the rules of the Society I herewith present a brief report of the exhibition in Division D. Although I cannot speak from personal knowledge of this as compared with the exhibition of former years, yet, from the

general expression on the part of visitors and exhibitors, I believe that at no former fair of this Society has there been so large or so excellent a show in this department. The total number of entries, as shown by the books of the Secretary, was 159, embracing all the leading varieties. It would perhaps be invidious to speak of the collections of any individual exhibitors in this report, yet the great variety and superior excellence of some of them would seem to merit a brief notice. Especially would we mention the exhibitions of W. K. Barber and Hayes & McElwain of Hastings, N. A. Bennett of Mason, and Ambrose Purchase of Jay, who made respectively eighteen, thirty-one, twenty-five and thirty-five entries. These were especially noticeable not only for their extent and variety, but from the evidence of care and skill in breeding.

The accommodations for exhibitors in this department were entirely inadequate to the requirements of the occasion, and I would recommend that larger, better arranged, and more attractive quarters be provided for future exhibitions in this department.

J. Q. A. BURRINGTON, *Superintendent.*

DIVISION E—FARM PRODUCTS, ETC.

To the Executive Board of the Agricultural Society of the State of Michigan :

GENTLEMEN:—I would respectfully submit the following as my annual report for division "E," for the year 1876:

Class No. 25. The number of entries in this class were somewhat less than on previous years, but the samples were very superior in quality, and nearly every variety was represented. The whole number of entries in this class was 53; number of premiums awarded were 24; amount of cash paid for such premiums was \$108.00.

Class No. 26—Roots and Vegetables. The articles entered in this class were of a superior quality, and considering the season, very creditable to the exhibitors. The exhibition of C. H. Wurts, of East Saginaw, and C. M. Hubbell, of Ypsilanti, were of sufficient importance to merit especial notice. Nearly everything given in the vegetable line was shown in its utmost perfection. The number of entries of each are as follows, viz.: C. H. Wurts, 104; C. M. Hubbell, 30; whole number of entries, 171. Number of premiums awarded, exclusive of discretionary and diplomas, were 110; amount paid in cash for premiums, was \$234.00.

Class No. 27. No entries for this year.

Class No. 28—Butter and Cheese. The offer in this class of \$25, \$20, and \$15, for 1st, 2d, and 3d premiums on domestic butter, brought out a large display of the finest quality, and a very grave difficulty was experienced in deciding which should be awarded the prizes. Entries of butter, 23. Entries of domestic cheese, 2. Entries of factory cheese, 4. Amount of cash premiums on same, \$160.00. I would respectfully recommend that in the future four premiums be awarded instead of three, consisting of \$25, \$15, \$12, and \$10, in this class, on butter; also, on factory cheese, that the premiums be \$30, \$20, \$15, and \$10.

Class No. 29—Sugar, honey, and beehives. Whole number of entries 14; cash paid for premiums on same, \$30.

Class No. 30—Bread and pickles. This department was filled with the customary good things which the ladies know so well how to provide, and its excellence was a very noticeable feature of the display, as was attested by the Superintendent and Viewing Committee, who very thoroughly tried several of the samples on exhibition. Whole number of entries, 36; amount of cash paid for premiums, \$41.

Class No. 31—Soap, etc. The excellent display of Messrs. C. Shults of Detroit and Shuder & Clark of Jackson was a credit to any company or any State Fair.

In the miscellaneous department the exhibition of cigars by M. Lounacker of Jackson was fine.

The amount of money paid on premiums in this division and for each class is as follows, viz:

Class No. 25.....	\$108 00
Class No. 26.....	234 00
Class No. 28.....	160 00
Class No. 29.....	30 00
Class No. 30.....	41 00

Total..... \$573 00

Respectfully, etc.,

F. M. MANNING,
R. G. HART.

DIVISION F—FARM MACHINERY.

To the President and Executive Committee of the State Agricultural Society:

The Superintendents in charge of Division F. (farm implements) would respectfully report that the exhibition in their department was very fine, being a credit both to the Society and to the exhibitors, many of whom during this centennial year having been called upon to make unusual efforts at the national exhibition, have still felt sufficient interest in our State fair to fill up this department with a larger, more attractive and practical exhibition of implements than ever before. The whole number of entries in this division were 323, divided among the several classes as follows: Class 33, plows, etc., 56; class 34, tillage implements, 37; class 35, seed drills, sowers, planters, etc., 25; class 36, haying and harvesting implements, 53; class 37, apparatus and machines connected with the cleaning and preparation of crops for market, etc., 49; class 38, miscellaneous farm articles, 66; class 39, dairy and household articles, 37; but the number of entries did not at all represent the number of implements or articles on exhibition, as in many of the classes under the same entry were displayed many machines or articles of the same kind differently arranged to show their adaptability to different work, or to make a display attractive to the patrons of the Society.

The whole amount of premiums offered in this division was \$623.42 diplomas, and 11 silver medals. This, in our opinion, is as small an amount as the Society can expect to offer and give the necessary encouragement to the exhibitors that the importance of the division would seem to warrant. There were many articles not enumerated in the premium list that we recommend to the attention of the Premium List Committee. The new departure taken by the Society in offering large premiums (compared with former years) to leading articles in each class has been a success, and we would recommend its continuance in the future. We think it has added largely to the attraction of the division, as well as caused a marked improvement in the quality of the implements, thereby benefiting the farmers of the whole State. These premiums were first offered with the intention of encouraging manufactories in the State but have been published in the premium list as open to all. As yet there has been no competition in several of the classes from other States, while in others almost the entire exhibition has come from them. While the whole policy of the Society is to open competition to all, we have no desire to make a specialty of this division.

It has never been the intention of the Society to make exhibitors pay for attendance tickets, yet the annoyance and dissatisfaction attending the distributing of them, as well as the time necessarily occupied in such distribution, would seem to require a radical change in the whole system, and we would recommend that a committee be appointed to take into consideration this subject as well as the number of viewing committees and their compensation during the fair.

In this department it has become very difficult to secure the necessary attention to the articles in the several classes, because of the number of implements to be examined and the limited time that can be spent at the fair, but if the whole subject could be left with two committees, with expenses while on duty paid, experts might be obtained without adding much to the expense of the Society.

All of which is respectfully submitted.

H. O. HANFORD.

DIVISION G—VEHICLES.

To the Executive Committee of the Michigan State Agricultural Society:

GENTLEMEN:—In Division G there were 49 entries, not a large number, certainly, for a State Fair, but though few in number, in quality of workmanship and finish I think the articles entered in this class of Michigan manufacture would not suffer in comparison with the same kind of work made in any other State in the Union. In this as in many other departments of manufactures the people of Michigan need not go abroad for work of superior merit. In many of the articles used by the people Michigan is already independent of the rest of the world, and by a proper development of the resources within her borders may soon become so in nearly all.

The accommodations for exhibitors in this department were on too small a scale altogether. Not more than half the carriages entered could be sheltered from the weather, much to the dissatisfaction of the exhibitors and the vexation of the Superintendent. A much larger amount of space must in future be provided or manufacturers will not exhibit valuable and highly finished work to be exposed to the sun and storm. A liberal provision in this respect would undoubtedly result in advantage to the Society.

J. Q. A. BURRINGTON, *Superintendent.*

DIVISION I.

To the President and Executive Committee of the Michigan State Agricultural Society:

SIRS:—As acting superintendent of the division I at the last State fair, I would respectfully report, that not expecting to act as superintendent of this department, I did not give the matter that attention I should had I been originally appointed as such, but will give such a report as I am able under the circumstances, asking your indulgence.

The hall for the display and exhibition of manufactured goods was all that could be desired, and I have often wondered that there was not a larger exhibition in this department. Can not this body incorporate some plan into their future work that shall bring out a greater interest?

In class 40, "Home Made," there were 29 regular entries, in which there were but two cases of much competition, to wit: woolen stockings and cotton socks. While seven entries were made in the unenumerated section, of these, I notice five entries for woolen socks, and no premium, and would suggest a premium be offered for that article in the future. There was also an entry of 10 yards of linen cloth in the list, upon which the viewing committee recommended a discretionary premium of \$3.00. An exhibition of long wool was made by Charles Proudley, of Jonesville. It occurs to your superintendent that it would be a move in the right direction to offer premiums for a display of wool samples.

In class 44 but three entries were made, and those by Camp, Morrill & Camp, of this city, as you will see by the list of awards. The show of silks, carpets, and rugs by this firm was good, but of foreign manufacture. Can not some means be devised by this Society that shall call out manufacturers of such goods, and induce an increase of such in this State?

In class 45 five entries were made, and by Holden & Tinker, all of this city, and to them the awards were made, as you will see in the printed list of awards. It seems to me that there should be a large competition in this important class, and some means should be taken to induce manufacturers to come out with their goods.

The exhibition of articles of leather and India rubber, class 46, was larger than those preceding; 30 regular entries appeared, and but little competition; Holden & Tinker, Hobb & Bliss, and C. Delanater being the principal exhibitors. In the "not enumerated" articles I find some that should go in the offered lists, to wit: Display of fancy lap robes, fancy blankets, hack harness, misses' and child's boots and shoes, display of whips and trunks, for which the viewing committee recommend discretionary premiums, and I would suggest such premium be a diploma. That there were 15 of these unclassified entries shows that our list needs amending. The display of trunks, etc., made by Hobbs & Bliss was very creditable, as was also that of harness by them. Holden & Tinker showed favorable in the line of robes and blankets, while John Kelley was the only exhibitor of boots and shoes.

In class 47, "Articles of Furniture," only 25 entries were made, and but eight of these were in conformity to the regular list. The center tables shown by H. J. Leighton, Ypsilanti, and the result of much labor, being inlaid of many hundred pieces to each, yet the taste of arrangement may be questioned. Stuart, Hale & Co., of Otsego, Allegan Co., were the only exhibitors of chairs, and those only of the common styles.

Very creditable was the display of school and church furniture by the Michigan School Furniture Co., of Northville. The material was well selected, and the finish and style good. The seats were easy to the sitter, and their noiseless hinges and strength must commend them to all interested.

In the "not enumerated" list we find 17 entries, upon many of which discretionary premiums are recommended as marked in the committee book, and the committee upon premium list are invited to see if some of these articles cannot be included in the list.

Attention is particularly directed to the numerous entries of spring bed bottoms, etc., also to burial caskets, cases, etc.

The number of competing entries in class 48 was 19; 4 of which were under the head of "not enumerated," and discretionary premiums are recommended as noted by viewing committees.

In stoves, the Michigan Stove Company was the only one exhibiting for premiums, and to them were awarded the prizes of the several articles of the list. These stoves were shown by Warner & Dodge, of this city. A fine exhibition of stoves was made by Pratt & Gibson, as follows: The "Occident," wood and coal cook stove; Telft's wood cook stove; "Crown Jewel," base burner coal stove; "Gazelle," soft coal stove; and "Laurel," wood stove, by the Detroit Stove Works. "Climax" base burner coal

stove, by Taplin, Rice & Co., Akron, Ohio. Beekwith Round Oak, Dowagiac stove, and the "Franklin Reflector," new open stove—Rice & McConnell, same place, showed the Delmonico Range, two sizes, "Fearless," coal or wood stove, "Forest Acorn," "Acorn" and "Novelty," coal or wood cook stoves, 5 sizes; also 3 sizes "New Dauntless," coal heating stove; 1 size "Franklin," portable, grated for coal; 2 sizes "Hickory," wood heater; 3 sizes "Newport wood heaters"; 2 sizes "Forest Acorn," wood heaters, manufactured by Rathbone, Son & Co., Albany. Also 4 sizes "Superior," coal heating cook stove, by Hunt, Miller & Co., New York; and 2 sizes "Coronet," wood heaters, by Rouse & Co., Cleveland.

Your superintendent would respectfully recommend that no premiums be offered for stoves, but that ample space be given for exhibition and trial.

I also noticed a number of articles in the miscellaneous class that should be in this class, or *vice versa*. It will be seen that there are 121 entries in this department, when it seems to me that many times that number should be made.

In conclusion I would urge that efforts be made to secure a better representation and exhibition in all classes in this division.

I am, etc.,

C. L. WHITNEY,
Acting Sup't.

DIVISION J.

To President and Executive Committee of Mich. State Agricultural Society:

GENTLEMEN:—Your humble servant, Superintendent of Division J,—musical instruments and sewing machines,—would beg leave to submit his report for the fair of 1876. There being no awards in this division, your Superintendent feels it his duty to more fully notice the exhibition made in his department than if the articles had been reported upon by committees.

In the many years I have had to do with fairs and musical men as exhibitors I have never seen better exhibitions or more general satisfaction than at our late fair at Jackson. I put the exhibitors at a distance from each other, thus allowing each to exhibit his instruments as he deemed advisable without disturbing the others, which action distributed the crowd usually gathered about musical performers.

The pianos on exhibition were good and more than are usually seen at a fair. Holmes & Thayer of Lansing had a collection of two or three styles, which did them and the fair credit. John Pettit of Jackson exhibited the "Light and Earnest" and the Fisher piano, while P. D. Bullock of Jackson showed the Hazleton upright piano, also the Hallet & Cranston pianos.

The display of organs was greater than that of pianos, Holmes & Thayer of Lansing showing a fine collection of the Packard organs, both parlor and orchestral. Cabinet organs were shown by A. D. Latyn of Detroit. John Pettit of Jackson showed the New England organs in four sizes, all of which were called good; also the Goodman pipe organ, the Mason & Hamlin, Syracuse, and Western Cottage. P. D. Bullock of Jackson had a fine display of American organs, a well known and largely used instrument.

There were in all twelve entries made and about twenty articles exhibited, adding much to the pleasure and interest of the occasion.

It is a remarkable fact not probably before chronicled in the proceedings of the Society that there was not a sewing machine on exhibition, although ample space could have been given exhibitors of this instrument.

In closing your Superintendent would remember gratefully the courtesy of exhibitors in his department, and trust that my successors may ever thus find cause.

C. L. WHITNEY, *Superintendent.*

DIVISION K.

To the President and Members of the Executive Committee of the State Agricultural Society:

In compliance with rule eight I beg leave to submit the following report for Division K., fine arts, needle work, etc.: The whole number of entries made in the division, 458; whole number of first premiums awarded, 169; whole number of second premiums awarded, 74; whole number of third premiums awarded, 2; whole number of discretionary premiums awarded, 20, divided as follows:

Class 50.—Entries, 138; first premium, 42; second, 28.

Class 51.—Entries, 9; first premiums, 7.

Class 52.—Entries, 8; first premiums, 6.

Class 53.—Entries, 21; first premiums, 15; second, 4.

Class 54.—Entries, 51; first premiums, 19; second, 11.

Class 55.—Entries, 92; first premiums, 43; discretionary, 9;

Class 56.—Entries, 93; first premiums, 20; second, 10; Discretionary, 11.

Class 57.—Entries, 38; first premiums, 15; second, 9; third, 1.

Class 58.—Entries, 8; first premiums, 2; second, 1.

The exhibition in classes 50, 55, and 56 were very gratifying both in extent and quality of work. In class 50 all the contributors except five were from Jackson. In this class the Society is specially indebted to the citizens of Jackson for their enterprise and public spirit in filling this department with first-class work. And especially is it under obligations to Mrs. Hayden, Mrs. and Miss McNaughton, Miss Titus, Miss Hasbrook, Mrs. Eggleston, Miss Kate Robinson, Mr. A. O. Revenaugh, Mr. M. Gilbert, Mr. R. M. McQueen, and Mr. Z. S. Moore of Jackson, and Mrs. John Peabody of Hanover, for the interest they took in the exhibition, and the value of their several contributions to this class.

Classes 55 and 56 were also largely filled from Jackson and vicinity. In these classes we are under special obligation to Mrs. Merriman for efficient aid in superintending, classifying, and arranging the articles in these departments, and to Miss Nellie O'Brien, Mrs. E. B. Griffiths, Miss Kate Griffiths, Mrs. Hayden, Miss Livermore, and Miss Fletcher, for the acceptable manner in which they discharged the difficult task of awarding the premiums in these classes.

The other classes were not as well represented as they have been at former fairs.

Respectfully submitted,

J. G. RAMSDELL,

Superintendent in charge.

DIVISION L.

To the Executive Committee of the Michigan State Agricultural Society :

GENTLEMEN:—In the miscellaneous department there were but thirty entries, embracing a variety of articles that in my opinion might appropriately be classed in other departments. These articles were scattered through all the halls; indeed they might be found, if found at all, in almost every department on the grounds, entailing a large amount of labor and some vexation on the part of the committee and the Superintendent in searching them out. Some articles entered at the last fair were not found at all by the committee. I would earnestly recommend that this department be omitted from the premium list for the coming year. A large share of the articles enumerated in the list may very appropriately be placed in the department of manufactured goods, some in machinery hall, some with the farm implements, a few, perhaps, in art hall, while trained goats might be classed with the animal show. I would also recommend that no premium be offered on super-phosphates or other artificial manures, unless some method of testing them by chemical analysis can be adopted, as it is utterly impossible for any committee to decide correctly upon their merits without such test.

J. Q. A. BURRINGTON, *Superintendent.*

DIVISION M—CENTENNIAL.

To the Executive Committee of the State Agricultural Society of Michigan :

GENTLEMEN:—The superintendent of the historical and centennial department of the late annual fair of this Society, would respectfully submit the following report :

This department being a new feature of the fair—but very appropriately introduced in commemoration of this centennial year—much effort became necessary, on the part of the superintendent and the committee who were given charge of the same, in looking up, and securing for exhibition even a *few* of the thousands of relics, ancient and curious, that are scattered through our State, many of which have a very interesting history, and all illustrating as *no words can*, the manners, customs, domestic economy, style of prosecuting the various industries, and *some* of them the valor and heroism, and the privations and trials connected with our country's early history. There are also vast numbers of Indian relics, which if collected and preserved, as they should be, will form the great unwritten volume, in which the generations that come after us will read the history of the savage life and customs of numerous tribes, composing a once mighty race,—soon to become extinct forever,—that for many ages roamed through the vast forests, and hunted the beasts of game—no wilder than they—over the unbroken prairie, now occupied by the thronged cities and the happy rural homes of the teeming millions, that, with all the aids that education, culture, and christianity can give, are pushing civilization's march across a continent.

Although we did not succeed in getting together as large a collection in this department as we desired, yet it is gratifying to be able to report 130 entries, many of them being quite numerous collections, and altogether forming, when arranged for view, a very attractive feature of the fair, as evidenced by the large numbers of interested visitors that constantly thronged that part of the hall occupied by this department.

The entries of specimens of Natural History were, some of them, very fine indeed, and we take pleasure in making mention of the same.

Of collections of stuffed birds, there were three entries; one of which, however, should have been entered as *embalmed* birds. The only money premiums offered by the society in this department, was for the *largest and best* collection of stuffed birds. The entry made by F. L. Reece, of Jackson, was very large and very nicely put up, and was by the committee, awarded the 1st premium; the 2d was given to Mrs. L. Eggleston, of Jackson, whose collection, though not as large as the other, was made up of very fine specimens, and nicely arranged.

The case of embalmed birds, entered by Prof. E. H. Crane of Colon, were finely preserved, and very beautiful, and the committee recommend the award of a Silver Medal to the same. Mrs. Eggleston also exhibited a very fine single specimen of stuffed birds. Two very large elk heads, and two antelope's heads stuffed, were exhibited by F. N. Wood, of Jackson.

Of display of insects, arranged and classified, there were two entries—one by the Detroit Scientific Association, consisting of quite a large number of cases, very finely put up, named and classified, and with the gentlemanly attention and explanations given by Dr. Swarts, by whom they were brought and entered, they were a very interesting and instructive part of the exhibition to many visitors, and to this entry the committee recommend the award of a Diploma.

Mrs. L. Eggleston also exhibited a fine case of insects; Miss Jesse Robinson of Jackson, and Mrs. Eggleston, each exhibited a very fine case of natural curiosities, some of them very rare ones, and to each of these entries the committee recommend the award of a Silver Medal.

A large and interesting mineralogical collection was placed on exhibition by Prof. E. H. Crane, to which the committee recommend the award of a diploma.

A collection of fossils was exhibited by G. A. Gavett, of Sandstone, and single specimens by Mrs. Dwight Merriman, Mrs. L. Eggleston, B. M. Davis, and Dr. J. L. Mitchell, of Jackson. The last mentioned one, a Venus flower basket, was very curious and beautiful.

An interesting collection of natural curiosities was exhibited by Miss Pamela Smith, of Monroe, among which was lava from Mt. Vesuvius, and rock from Gibraltar, Spain. There were numerous specimens of Indian relics on exhibition, among which, as worthy of notice, we would mention a beautiful feather cape of a Pottawattomie Chief, exhibited by Mrs. Dwight Merriman,—the feather head-dress of a Sioux warrior, by Joseph Wicksawba, of Grand Haven,—several Indian curiosities by G. L. Gavitt; also, an Indian basket curiously made, and an idol, and several interesting relics of the last war, by B. M. Davis. Miss Pamela Smith exhibited a very large and interesting collection of Indian relics, also three ponderous pieces of Mexican armor, a set of Mexican spurs, a fine sword taken by Gen. Joseph R. Smith from a Mexican General, and numerous other trophies captured by Gen. Smith during the Mexican war. Also a very beautiful silk battle flag, captured from the rebels during the late war, and also the beautiful sword and belt worn by that gallant officer, her father, through his long career of military service. Miss Smith also exhibited a very remarkably fine specimen of a stuffed deer.

On the whole of the above noticed collection the committee recommend that the Society award Miss Pamela Smith \$25 premium. The numerous crowd of visitors were much interested in viewing a large collection of Indian wearing apparel and implements of war exhibited by the Audubon Club of Detroit, which formed a very prominent feature of the exhibition in this department, and the committee take pleasure in recommending the award of a diploma to the said club.

There were numerous articles on exhibition both ancient and curious and illustrative of the early days in our country's history, some of them being more than 100 years old, of which your committee take pleasure in noticing some specimens of crockery exhibited by Mrs. M. Johnson of Jackson; also one of the earliest styles of Howe sewing machines, exhibited by Willis J. Johnson of Reading, and presenting in its rude structure a striking contrast to the beautiful machinery of to-day that lighten so very much the domestic labors of nearly every family.

The full style of dress of an Esquimaux girl was exhibited by Martin Johnson of Grand Haven.

Two very ancient books, one in Latin and printed in 1602, the other a little later, entered by Chas. T. Payleson of Grand Haven.

Mr. G. L. Gavitt exhibited an ancient warming pan that for more than 100 years had carried comfort to many a sleeper's couch.

An English barrister's wig, very beautiful and nicely kept, was exhibited by Hon. W. L. Webber of Saginaw, and an engraving of the coat of arms of the Peers of England for many generations past was shown by H. B. Fry of Leslie.

J. J. Duer exhibited a whaler's harpoon, a whale's tooth, a South Sea Islander's war club, a hideous looking weapon, and a collection of minerals; also a very large collection of ancient coins and currency, some of which were coined before the beginning of the Christian era, to which last named collection the committee recommend the award of a silver medal.

Martin Johnson also placed on exhibition a Danish silver coin more than one hundred years old.

Mrs. Dr. Chittock, of Jackson, exhibited a plan of the city of New York from a survey made in 1728.

Mrs. Chas. Benedict, of Jackson, entered a set of swifts such as our mothers used to wind yarn upon in the days gone by. Also a New York paper printed at the time of, and containing Gen. Washington's farewell address to the army.

A pair of linen sheets and a double carpet coverlet, woven by hand fifty years ago, were exhibited by Mrs. Brundage, of Jackson, and were much admired.

Mrs. Dwight Merriman exhibited a volume of Paraphrase of the Psalms printed in 1680, also a curious specimen from Pompeii, and a whip of sea kelp from Barbadoes. A very ancient school book was exhibited by M. J. Fowler of Jackson.

Father Buyse, of Jackson, exhibited 22 volumes of ancient books,—a very rare collection,—many of them being over 300 years old,—some printed in Latin, some in French, and some in Flemish language.

A collection of centennial curiosities was exhibited by H. A. Wetmore, of Concord, in which were many very interesting specimens, and the committee would recommend to this collection a discretionary premium of \$5.00.

Of Revolutionary relics there were some very interesting specimens, and the committee would make particular mention as worthy of notice of the sword and pistols and military commissions of Gen. Peter Mulenburg of Revolutionary fame, also a certificate of the "Order of Cincinnati." These interesting relics are in the possession of Frank P. Mulenburg, of Galesburg, Mich., a descendant of Gen. Mulenburg, the only surviving male member of the family, and were placed on exhibition by H. Dale Adams, of Galesburg.

But around no one article on exhibition did the crowd of visitors oftener gather or manifest a deeper interest than that with which they looked upon and handled the sword, belt, and breast-plate of Col. Ethan Allen of Ticonderoga fame. These invaluable relics of times that are memorable, and of a hero whose name is immortal, are now in the possession of Mrs. Emma C. Hopkins of Spring Lake and were sent by her for exhibition. A large and finely preserved birch-bark canoe, and along side of it a beautiful modern shell boat, were placed on exhibition by the boat club of Monroe.

A very curious relic of the Chicago fire and a beautiful automatic fountain were exhibited by Peter Mulrany of Marengo.

In compliance with the request of the committee in charge of this department, and with the consent of the friends of the late gallant Gen. Custer, the Custer Monument Association of Monroe added very much to the interest of the exhibition by furnishing a very large collection of very choice and curious Indian relics, captured by the General in the wars upon our far western frontier, and hanging among these relics was a large and beautifully executed portrait of Gen. Custer, and also the sword that that brave and lamented young General waved so defiantly before the enemy in many a gallant cavalry charge during the war of the rebellion. Officers of the Monument Association were present and added much to the interest by kindly answering the thousand questions asked in regard to these relics by the crowd of visitors that were constantly gathered around them, and your committee would earnestly recommend that a premium of \$100 be awarded by this Society on this collection to the Custer Monument Association.

All of which is respectfully submitted.

J. WEBSTER CHILDS,

Superintendent of the Historical and Centennial Department.

REPORTS FROM COUNTY SOCIETIES.

ARMADA AGRICULTURAL SOCIETY.

The third annual fair of the Armada Agricultural Society was held on the Society's grounds in Armada village, Wednesday, Thursday, and Friday, October 4th, 5th, and 6th, 1876, and was a success in all its departments. The weather for the first and second days was clear and cold, and the attendance quite large. The last day, however, opened cold, with a cloudy sky, which brought out during the forenoon a terrible storm of wind, rain, and hail, which threatened to break up the exhibition. Fortunately, the storm was of short duration, and the remainder of the day was fair, but cold. The weather prevented as large an attendance as was anticipated, although the receipts were as large as last year, and larger than could have been hoped for in the morning.

The number of entries made were 1,200, an excess of 189 over last year. The Society increased their premium list \$200 over last year, and after paying premiums and all indebtedness against the Society, have a good balance in the treasurer's hands.

The centennial department was an attractive feature of the fair. For this department the Society constructed a log house, 24x36 feet, built in ancient style of architecture, with large fire-place and stick chimney. This department attracted many visitors. A roaring fire was kept up in this building, which made it a capital place of shelter from the cold and rain during the fair, while the relics and curiosities of "Ye olden time" added still more to its interest.

The Society now owns the ground occupied by them for holding their annual fairs, having purchased the same during the past year; and they hope during the coming year to make it one of the most pleasant and attractive grounds in the State.

The annual address was given by Hon. A. B. Maynard, on the afternoon of the last day. The address was well received, and I forward you the manuscript with this report, deeming it worthy a place in your forthcoming annual report.

The officers of the Society, at present, are as follows, viz.:

President—Charles Andrews.

Vice President—John McKay.

Treasurer—Charles A. Lathrop.

Secretary—J. E. Barrington.

Directors—J. Hebblewhite, Geo. W. Phillips, Jas. Stephens, W. D. Pettibone, X. O. Cudworth, Neil G. Reed, H. H. Spencer, Robert Stewart.

BARRY COUNTY.

The Barry County Agricultural Society held its annual fair on its grounds in Hastings on the 27th, 28th, and 29th of September. Although the weather was not altogether favorable, the attendance was quite good. The exhibition of stock and of fruits and vegetables was better than has ever before been seen on our grounds. Fancy articles were somewhat neglected, but in all the essential features of successful husbandry the exhibition showed considerable progress. Financially the fair was a success, paying all expenses and reducing the debt of the Society nearly \$300.00, and with funds enough on hand to pay all claims, except about \$50.00, still due on the last purchase of land.

Herewith is a list of the officers for 1877:

OFFICERS FOR 1877.

President—John Dawson.

Vice-President—Henry Houghtalin.

Secretary—Travers Phillips.

Treasurer—D. Striker.

Directors—S. J. Bidleman, T. Altoft, C. J. Norris, Burton King, and J. C. Bray.

Marshal—Peter Cramer.

GENESEE COUNTY.

It was a wise provision of the founders of this Society that its managers should be required to make a yearly statement, not merely of its own transactions and condition, but of the general condition of the agriculture, horticulture, and manufactures of the county. It serves to place upon durable record a history in abstract form of the progress from time to time of those interests which form the basis of the productive wealth and industry of this community, and enables us to trace the gradual development which the enterprise of our own people exhibits in the general advance which distinguishes this prosperous commonwealth.

In presenting you with the twenty-seventh annual report of this board it once more becomes our province to congratulate you upon the continued success which attends the society in promoting the objects for which it was instituted, more than a quarter of a century ago.

In reviewing for the past year the atmospheric conditions which exercise so potent an influence over the productions of the soil, we find them in some of the stages far from favorable to the development of superior crops. The wheat-sowing time of 1875 was succeeded by a winter of the most unsteady temperature, alternately and suddenly freezing and thawing, with but little snow to protect the surface of the ground from the effects of the sudden changes. The spring of 1876 presented a more favorable aspect, but before the maturity of any crops was followed by intensely hot weather, ungenial to all plants not of a tropical nature. The harvest time was fine, and the fall season pleasant and unvisited by severe frost until late in the year. We will now briefly note the effects of these conditions upon the leading agricultural staples of this county.

FIELD CROPS.

Wheat.—The uncommonly frequent variations of temperature through the winter were almost fatally injurious to the young wheat plant, standing unprotected from their influence. As soon as it began to recover a little under moderate weather from the heaving process of a sudden frost, the recurrence of another would repeat the evil, and the delicate fibres of the roots had to contend against such repetitions of the strain that on the opening of spring the fields presented the most unpromising appearance. A very favorable growing season through the spring months, however, enabled the plant to recover its vitality in an unexpected degree and led to the prospect of a good yield until near the stage for ripening, when the intensely hot weather which set in caused a shrinkage of the berry disastrous both to its quality and quantity, resulting in general disappointment of the hopes previously entertained. And though in exceptionally favorable situations some good crops were obtained, the general average we cannot estimate higher than twelve bushels to the acre, and that of inferior quality.

Oats.—Farmers who sowed their oats early found the conditions favorable for doing so, which those who performed that work later in the season did not experience. The good growing weather developed a strong and healthy plant, and the appearance of the straw indicated a heavy crop, until struck at its most critical stage by the extreme heat, from which it suffered in a similar manner as the wheat crop. It was noticeable that where the seeding had been done early, on rich and well prepared ground, large crops reaching sixty and seventy bushels to the acre were harvested, though the general average yield per acre did not exceed about twenty-five bushels of poor and light grain. The difference is attributed to the fact that the early sowing caused the grain to be so far matured when the hot weather set in as to be past the stage at which the heat proved so destructive to the less advanced fields.

Corn.—Rainy weather interfered with planting corn to the best advantage at the usual season, after which great heat with deficiency of moisture affected injuriously its progress. While the corn was in the milk it had to contend with the effects of about two weeks of the excessively warm weather already spoken of. The result was that though the product was not heavy, the ears were sound and perfect to a remarkable degree—quite superior in quality to the crop of 1875. The average yield was about thirty-five bushels per acre.

Barley.—The yield of barley was generally light, that crop suffering from the weather in a similar manner to its effect upon oats.

Hay and grass.—The meadows yielded a large crop, their growth being promoted by the same causes which stimulated the straw of the cereals. The product was as heavy, we think, as any ever cut in this county, and it was saved in good condition, averaging one and a half tons to the acre. The extensive shipment from the county of pressed hay, referred to in previous reports, is still increasing in magnitude, and forms a profitable source of revenue, the demand from abroad calling for all that can be spared from home consumption. Clover seed was inferior in quality—the yield light, and the seed small. The pastures grew liberally throughout the season, producing plenty of feed.

Potatoes.—In complete contrast to the experience of last year, except in a few instances the potato crop was a failure. The dry, hot weather stunted the growth of the tubers, and the beetle reappeared in numbers upon the vines. Those who have potatoes to sell are fortunate, and will realize a good price.

The Early Rose variety, owing to its early maturing, seems to have done better than most of the others.

Roots.—There continues to be a growing recognition among stock raisers of the value of roots as winter food for animals, and the extra labor attendant on their successful cultivation is the principal obstacle to the more extensive production of this important adjunct to hay and grain. Above an average crop was obtained, and the fine specimens exhibited at the county fair demonstrate the adaptability of our soil and climate for the successful production of many of the best varieties.

FRUIT.

Fruit of every kind except peaches and plums was abundant and of superior quality. Apples, as if in recompense for the deficiency of last year, were more plenty than in any previous year within our memory. The quantity was immense, and much of the crop was packed and sent abroad, while cider was super-abundant. Pears were good. Small fruit of all sorts plentiful and excellent.

STOCK.

There is a steady and gratifying increase observable in all branches of the stock departments. The interest manifested by our leading stock farmers, who are yearly increasing in number, shows that the time is not far distant when Genesee county will take a front rank in the stock raising counties of Michigan.

Cattle.—All judges seem to agree with us that the show of blooded cattle at the last fair was the best exhibition we ever had. In our report for 1875 we had occasion to speak of the introduction in that year of numerous full-blooded animals from the herds of celebrated breeders. We have now the satisfaction of reporting that during the year 1876 further additions by the importation of some of the best strains of blooded stock have been made to the herds of Messrs. H. R. Dewey, Jacob Bedtelyon, and John Joy of Atlas, Ezra Mead of Grand Blanc, Thomas Shaw of Mundy, G. E. Hunton of Forest, and William Hamilton of Flint. We do not know that these comprise the names of all importers of this year. There may be others whose additions we have not yet learned, but the list as it stands is a good credit mark for the cattle department.

In one direction the effect of these efforts at improvement were notably visible—in the superiority of the dressed fat beef cattle to be seen in the various meat markets of this city during the recent holiday season. The display of "Christmas beef" would have done no discredit to the markets of any metropolitan city in the country.

Horses.—To the strong array of sire horses in Genesee county, enumerated in last year's report, another noted stallion has to be added, "Mambrino Vandal," imported in June last from Illinois, by Mr. William Hamilton. He was sired by "Mambrino Pilot," and is therefore half brother to "Gift." Likewise a fine Scotch Clydesdale stallion, "Lord Invererie 2d," imported by Mr. Wm. H. Cook, of Fenton. To the brilliant list of names of stallions heretofore mentioned in our reports may now be also added to that of Messrs. Nyes & Foster's four-year-old, "Mambrino Turk," a very promising horse, sired by "Gift." These instances sufficiently indicate that there is no falling off in the attention devoted to this interest in our county.

The show of colts, the progeny of "Potter's Henry Clay," and of "Mambrino Gift," introduced in competition for the sweepstakes premiums for sire horses at the last fair, brought together in a group an exhibition of young

horses that attracted the general admiration of connoisseurs, and spoke volumes for what those celebrated sires are doing for the improvement of our roadster class of horses.

Sheep.—There is a manifest revival in the fine-wooled sheep interest. High prices have been paid for animals of merit, with good pedigrees, and sales at corresponding figures are of frequent occurrence. Those who take a special interest in Merino sheep, seem determined to bring their flocks up to a high standard of excellence. Prominent among the importers of this class are Messrs. John Good of Richfield, H. R. and D. P. Dewey, J. H. Thompson, and Oscar Beals of Grand Blanc. Inquiry after the most profitable breeds of sheep for mutton, and the varieties whose constitution is best suited to our climate, is the subject of attention, investigation, and experiment. The breeding of Southdowns and Cotswolds, among the middle and long-wooled sheep, seems to have been the most successful in this line, hitherto.

Swine.—A determination to keep only the most approved breeds of swine, becomes every day more manifest, and in this, as in other branches of stock raising already spoken of, importations of valuable animals have been made within the year. Among those that have come under our observation are Essex boars of much merit, brought in by Mr. J. L. Jennings of Mundy, and Mr. D. S. Halsted of Vienna. Live hogs are shipped from this county by thousands; and the quantity of dressed pork bought at Flint, Fenton, and other points, for packing, has grown to an enormous traffic. Of the various esteemed breeds, Berkshire seems to take the lead, although many prefer Suffolk, and others, Essex. The large-boned, heavy-framed, long-headed porkers, that once were the prime favorites, have almost if not entirely disappeared.

Poultry.—There is no class in which a single year has produced so great a revolution, as in the exhibition of poultry. This change was brought about by the organization in Flint, in December, 1875, of the Northern Michigan Poultry Association; and their holding a very successful poultry fair in the month of February following. The formation of this poultry association at once awakened into active life a taste and interest evidently existent, but previously dormant. The impetus thus given, extended itself to our county fair, and the large show of the various standard classes of poultry was to many one of the most attractive features of our annual exhibition. Few had any previous idea of the extent, variety, and quality of the choice poultry owned in this county until thus gathered together.

The Poultry Association have made the arrangements for their second annual fair, to be held from the 19th to the 23d of February next, inclusive, so that there seems to be no danger of this newly awakened interest dying out or flagging.

Manufactures.—The manufacturing interests of the county continue to exhibit as flourishing a condition as we have heretofore reported. We again recapitulate the leading manufacturing industries of the county, viz.: Lumber, woolen goods, house fittings, carriages and wagons, household furniture, machinery, farming implements, dairy products, leather, brooms, harness, boots, shoes, etc.

A new industry has been started within a few weeks, which promises to become important and extensive in its scope. A company has been formed called the Flint Broad-cast Seeder Company, and is now in full operation, for the manufacture in Flint of the "Wolverine Seeder," for sowing all kinds of grass, seeds, and grain broadcast, also plaster and ground fertilizers. Mr. Oliver Perry is president of the company, and Mr. Oren Stone secretary and

treasurer. Under such management as theirs, the enterprise cannot fail of success, if the machine maintains the good opinion of the farmers with which it has started out.

Another is the manufacture of malleable cast iron at the Genesee Iron Works of Kimball & Co. in the city of Flint. This merits special mention, it being the only malleable iron foundry in our State, and its work is distributed all over Michigan and into neighboring States.

TRANSACTIONS.

The transactions of the society during the year present no unusual features.

The twenty-sixth annual meeting was held on the 12th of January, 1876. After the presentation and acceptance of the annual reports the following officers were elected by ballot:

President—Henry Schram of Burton.

Secretary—Francis H. Rankin of city of Flint.

Treasurer—Oren Stone of city of Flint.

Directors, each for two years—Elijah W. Rising of Davison, John C. Dayton of city of Flint, Chandler H. Rockwood of Genesee, Joseph M. Peck of Mundy.

The board of directors held meetings for the revision of the premium list and appointment of judges on March 7th and 24th and June 8th. Some of the classes for competition were considerably extended, and that of delaine merino sheep stricken out as not affording any marked distinctive characteristics from those of fine merino sheep. In view of the interest already spoken of as having been created in the exhibition of poultry, the board appropriated the sum of \$75 and invited the officers of the Poultry Association to apportion the same in suitable premiums for the different varieties and take charge of the arrangement of the coops and regulations for their exhibition at the county fair, which they did with marked success; and the society is indebted to them, and especially to Col. O. F. Lochhead, for the time and ability devoted to that work.

In other respects no material change was made from the programme of the previous year.

At a subsequent meeting it was deemed advisable to take measures for erecting a new building for the poultry exhibition and for remodeling the interior arrangement of the floral hall. A committee was appointed to take direction and supervision of the work, which was duly performed, and the result found to be valuable improvements. The poultry hall covers 24x42 feet, with 14 feet posts, windows on the sides and shingled roof. Experience proved the wisdom of this erection, for the exhibition there drew a crowd to the hall during the entire continuance of the fair.

The county fair opened on September 26th and held four days. It was feared by many that the concentration of attention upon the great Centennial Exposition would entirely defeat the attraction of local exhibitions in the centennial year. To some extent it did undoubtedly interfere with our fair, as very many of our usual members and exhibitors were absent at Philadelphia. Still the fair was quite successful. The show of cattle was the finest we ever had. All the best horses in the county were present, though the entries were not so many as in 1875, and there was a larger proportion of inferior horses shown than in that year. As usual the show of sheep was large and superior; and there were many fine animals in the hog pens. The poultry exceeded any thing in that line ever before seen on the grounds. We had the usual display in the other halls, the fruit, vegetable, and field crops being all superior. The awards of the

judges having been published need not be further referred to here. None of them were contested.

Several applications having been made to the board to rent the use of the fair grounds, we have made a lease for the year 1877 to Mr. John C. Dayton, for \$150 and certain stipulations for keeping the grounds in repair, that being the best offer made.

For statement of the finances we refer you to the report of the treasurer.

All of which is respectfully submitted for the board of management.

F. H. RANKIN, *Secretary*.

FLINT, December 31, 1876.

HILLSDALE COUNTY.

In compliance with statutory provisions of the State, and the requirements of our own organization, the Hillsdale County Agricultural Society submit a copy of their 26th annual report.

The results of the year now closing with the agriculturists of the county are probably similar to those of other sections of our common country. The depression in most classes of business, the shrinkage in values of land and every class of products has tended to make the times hard, and as a result the effort to production has not been pressed with former zeal, but few looking farther than to meet the necessities of the year.

Our crops were generally of good growth, but the cultivating season of June and July was so very wet and hot that it resulted in an impaired quality of wheat and corn, two of our leading products, the first by rust and shrinkage, the second by weeds or non-cultivation; consequently our harvest was inferior to many former ones, but sufficient for home consumption with something to spare.

The hay crop was large. Clover because of continued rains was very much damaged in curing. Other grasses being later produced a very fine quality of hay.

The potato crop was unusually poor, in fact, the poorest ever raised in the county. We can hardly account for the failure. The vine was seemingly thrifty,—bugs more so, but by persistent effort they were held back from excessive damage,—yet with the best of cultivation very few tubers formed, and these of inferior quality. The temperature of the season and care bestowed should have given a large crop, especially of the early varieties.

The oat crop was large in growth, but light in berry. Many fields were nearly spoiled by rust.

Our fruit crop was very fair, and for want of a market it was a drag on our hands. What was marketed hardly paid expense, and the question is often asked if we are not overdoing this branch of agriculture.

We note steady and increased interest by the farmers in the selection and breeds of their domestic animals.

Many very valuable foundations are being laid for herds of the noble Short-horn. Our feeders have learned of their intrinsic value for beef-producing, and everything of high blood “not held for breeding purposes,” is seized with avidity for feeding purposes, even at fancy prices.

In the breeding of horses we stand on a footing with many counties in the State. A medium size adapted to the farm and road take the lead, but the heavy draft are being tried by some. Their profit is yet to be determined.

Our flocks are not large, but generally select. The low price of wool for the last two years has caused most thorough culling, and the result is a third less mouths to fill and care for, yet an equal amount of wool. Besides this, our flock-masters have resorted to feeding for eastern markets more than ever. This helps to balance up the account and keep up the fertility of the farm.

Our swine are of a high type; very few mongrel or mixed pens are seen. There are two classes: large and small boned. The former are made up of Magee and Poland (by many these are claimed as one and the same breed). Of the latter we have the Berkshire, Essex, Suffolk, and a hog from a cross of the little Grass of twenty years ago on the better Chester Whites. This will be the favorite with those who are prejudiced on color, as they mature early, are very docile, and have an abundance of hair which will prevent cracking.

Our county is having a severe and protracted run of hen fever. It develops in some twenty different types. Every city and village is full of it, and it is spreading to every farmyard in the county. The disease having been carefully diagnosed, we have no particular fear of the result.

Since our last report more than a half million of dollars of our manufacturing interests have yielded to the pressure of the times and closed their works. The effect of this will be most seriously felt by the whole county. Our artisans will be driven out, our population diminished, and our home markets curtailed.

Our educational interests are in fine condition throughout the county. Union and district schools were never in a more flourishing condition. Another beautiful hall, 72x52 feet, three stories and basement, for the commercial department, has been added to the group of new buildings for Hillsdale College the present year, making now four out of the five of the group already built, giving facilities for educating over a thousand of our young men and women at once.

Of the many sources for practical information and enjoyment to the tillers of the soil, there is none that will compare with a well-regulated agricultural fair. It is here that all meet on an equal footing; it is here acquaintances formed often ripen to lasting friendships; here the eye is trained by comparison to detect imperfections or measure values; here lessons in human nature may be learned in the shortest period; selfishness and ill-breeding, as well as liberality and refinement, will be conspicuous at every turn. To those who have long enjoyed these schools of instruction, it would be a great disappointment to be deprived of their annual visits. To show the interest taken in making our exhibitions a success, we append a tabulated statement of the number of exhibitors, number of entries, number of awards, and amount of premiums in each department of our last fair.

Department.	No. of Exhibitors.	No. of Entries.	No. of Awards.	Premiums Paid.
Shorthorns.....	15	26	23	\$120 00
Jerseys.....	2	5	5	18 00
Grades.....	10	20	11	45 00
Oxen and steers.....	14	20	17	88 00
Fat cattle.....	26	21	16	36 00
Horses.....	130	162	67	188 50
Sheep.....	9	63 pens.	28	64 00
Swine.....	26	59 pens.	30	107 00
Poultry.....	57	127 coops.	75	90 00
Carriages.....	12	49	21	75 00
Farm and barn implements.....	43	94	43	52 00
House furniture and iron manufacture.....	33	94	48	109 75
Leather goods.....	4	14	11	23 00
Boys' department—mechanics.....	5	21	11	11 50
Grain and seeds.....	28	55	21	17 50
Vegetables.....	30	136	78	51 50
Boys' department—agriculture.....	7	10	9	6 75
Conserve products.....	45	159	60	54 50
Girls' department—Conserve products.....	9	21	13	15 00
Domestics.....	32	72	28	18 75
Needle-work and millinery.....	86	220	88	96 50
Girls' department—Needle-work.....	13	22	22	16 75
Painting, shells, and miscellaneous.....	21	64	22	62 00
Floral.....	41	134	44	89 50
Pomological.....	87	746	156	139 50
Centennial.....	8	8	8	20 00
Trotting.....	20	27	18	371 00
Total.....	793	2,449	973	<u>\$1,987 00</u>

The receipts from fair were.....	\$2,301 98
Expenditures—For premiums.....	\$1,987 00
Expenses.....	551 93
Secretary and Treasurer's salary.....	325 00
	<u>2,963 93</u>
Net profits.....	<u>\$1,338 05</u>

We have made improvements to our grounds the present year as follows: 1,000 feet in length of sheds, making 200 stalls and pens for cattle, sheep, and swine. These have been built in the most substantial manner, with shingle roof and well painted. These, with former ones built, make a perfect outfit for our stock. We have in addition built a hall 30 feet square of fine architecture for the convenience and comfort of ladies visiting the fair. This is divided in two rooms, in one of which is every convenience for the toilet.

These improvements have cost us \$2,400.00. This leaves us in debt about \$2,500.00.

The officers for the ensuing year are as follows:

President—Daniel Timmes, Moscow.

Vice President—Frank Fowler, Reading.

Secretary—F. M. Holloway, Hillsdale.

Treasurer—Chas. H. Winchester, Allen.

All of which is respectfully submitted.

F. M. HOLLOWAY, *Secretary*.

HILLSDALE, December 31, 1876.

INGHAM COUNTY.

The Farmers' Club of Mason, Ingham county, take a large interest in matters connected with the raising of fruits, and the following abstract of their work during the year is given, with supplementary papers.

OFFICERS.

President—A. F. Wood, Mason.

Vice Presidents—James Fuller, Vevay; P. O. address Mason. John Gearhart, Wheatfield; P. O. address Mason. C. C. Marsh, Alaiedon; P. O. address Mason.

Recording Secretary—L. H. Ives.

Corresponding Secretary—A. M. Chapin.

Treasurer—D. C. Smith.

Board of Directors—H. Bristol, H. J. Knight, one year; G. W. Wilson, James L. Fuller, two years; W. Asa Rowe, Willis Horton, three years.

Essay Committee—L. H. Ives, Otis Fuller, W. Asa Rowe.

SECRETARY'S REPORT.

The year which has just closed—the centennial year—has been one of the most eventful in the history of our nation. The great world's exhibition, which was for so many months the center of attraction, will doubtless leave a permanent and beneficial influence on all branches of science and industry in this country, and I believe that the interests of this club will be greatly advanced by it. Many of our members returned from Philadelphia with enlarged views of things in general, and with a determination to go forward and keep pace with the age.

The centennial exhibition, and the excitement of a presidential campaign, have conspired to reduce the number of our weekly meetings during the summer and fall months. However, it seems to me, if I understand the signs, the pulsations of the club to-day indicate a healthy action of all its vital functions.

A call from the Secretary, after a few weeks interruption, has never failed to meet with a hearty response by the members of the association.

The greater portion of what has been accomplished during the year was done during the winter and early spring time.

The following are the titles of some of the essays read during the year, aside from those which are appended in full:

A. M. Chapin—"Garden Seeds."

Otis Fuller—"Our Schools and our Tax-payers."

C. C. Marsh—"Care of Farm Horses."

T. H. Lyon—"Farm Stock."

Wm. M. Webb—"Preservation of Forest Trees."

Alex. Bush—"Our Public Highways."

O. M. Barnes—"Centennial Address on the Occasion of Tree Planting."

C. L. Ingersoll, State Agricultural College—"Improved Breeds of Swine."

W. A. Rowe—"Injurious Insects."

W. S. Branch—"Dislike of Farming."

L. H. Ives—"Distribution of Seeds," etc.

A. M. Chapin—"Insurance."

Among the temporal improvements made during the year, I notice the large black-board, the material of which was presented by Mr. Wm. Webb, of Aurelius. Samples of the various woods found in this vicinity, collected and presented by members of the club, besides a small collection of rare specimens presented by N. A. Dunning. Several volumes have been added to the library, mostly public documents. A liberal distribution of seeds was made last spring,

from which, as yet, no reports have been received. I trust this matter will receive the attention due at an early day. All persons receiving seeds through the club from the department of agriculture should report the result of the experiment. If a failure, from what cause. If a success, kinds of soil, manner of cultivation, etc., or any fact tending to throw light on the matter by which others may profit. Several pictures, charts, and maps have been placed on the walls of the club room, which are both useful and ornamental.

The Club is indebted to Mr. R. G. Baird, Secretary of the State Board of Agriculture, for a supply of the Reports for 1875, for the use of the Club. Also to J. P. Thompson, Secretary State Pomological Society, for several copies of the doings of that Society for 1875. These reports are both replete with good practical information. Every farmer should read and re-read them to profit.

The poultry exhibition given under the auspices of the Club in January brought together the finest collection of poultry ever shown in Central Michigan. The attendance of visitors was not creditable to the public, though the display of high-bred poultry certainly reflected great credit on their fortunate possessors. I would suggest that this feature of the Club be maintained, as I believe it has already proved a source of revenue to all who have endeavored to profit by it.

A plowing match was held in June last, which was voted a complete success. The attendance was large and competition close in all classes. For full particulars see report of Secretary.

In addition to essays and exhibitions named, discussions of wide range have been held at various times, which must result in good to those who participated in or listened to them.

The association has paid for the use of this room the past year \$30. This amount was paid promptly from membership dues, the only regular source of revenue enjoyed by the Club.

The annual membership fees were fixed at \$1. This, by economical and judicious management, has proved ample to meet all necessary expenses.

In conclusion, let me say that our prospects were never better than now for doing regular and prosperous work in the Club, and it is my conviction that the year '77 will be quite prolific in good results.

L. H. IVES, *Secretary*.

KALAMAZOO COUNTY.

SECRETARY'S REPORT.

Time in its resistless flight has brought us to the close of another year—the centennial year of 1876. The members and friends of the Kalamazoo County Agricultural Society have assembled here to-day to review the transactions of the Society for the past year, and to make such preparations as may be deemed advisable for the business of the coming year.

Notwithstanding the unfavorable weather of the last two days of the fair, I am pleased to announce that the receipts from all sources were sufficient to pay

all contingent expenses and premiums, both regular and discretionary, and that a small balance has been added to the funds in the treasury.

There were many friends at the outset who predicted failure, or at least moderate success. They said that the year was unpropitious for such enterprises. The great national exhibition at Philadelphia would absorb public attention and the spare change or means of the country, and besides this the Presidential campaign would involve in its surging tide of excitement and anxieties the entire people of the country. But the officers of the society were not dismayed, neither did they relax in any way their efforts in furtherance of the interests of the association. The result shows that neither the centennial exhibition or the contest for the Presidency had any appreciable influence, or affected materially the prosperity of the society.

Officers of an agricultural society appreciate more fully than any other class of people, probably, the many contingencies that overhang and determine the success of an out-of-doors exhibition. No matter how thoroughly the preliminaries may have been adjusted; no matter how well disposed the people may be to render their share of assistance, a storm on the principal day of the fair, if of any considerable magnitude, will bring to naught, in a pecuniary sense, the entire work of the season. Probably three-fourths of the county agricultural societies of the State held their fairs the same week in September that we did, and all of them suffered in a greater or less degree from the unfavorable weather that commenced Thursday morning, the 26th of September, and continued on through the rest of the week. The week following was no better,—worse if anything,—and so we have reason to be thankful that we pulled safely through without pecuniary loss.

Competent fair judges in such matters have estimated that the rain storm of Thursday forenoon diminished the receipts at the gate at least one thousand dollars. I think it is safe to say, from all the previous indications, which were unusually and decidedly promising, that had the weather continued favorable we should have realized the most successful fair ever held by the society.

Year by year there has been a decided improvement in the interest manifested in the society by the people of the county. The attendance also has been steadily increasing, and the entries in the various departments have been larger in number and better in quality.

The marked improvement in numbers and quality of the cattle on exhibition at the last fair, in comparison with former years, is deserving of special mention.

Herein may be seen the direct influence of our annual exhibitions in awakening an interest and stimulating a healthful emulation which is producing valuable and satisfactory results.

Six thoroughbred Shorthorn bulls of various ages were entered for competition, one of which, owned in this county, gained the blue ribbon over all competitors at the Michigan State Agricultural Fair of 1875.

There were fifteen grade bulls also exhibited, some of them scarcely inferior to the thoroughbreds; while the show of herds of thoroughbreds, grades, and of fat cattle elicited universal commendation.

In regard to the comparative merits of Shorthorns and other distinct breeds, it is not my province at this time to discuss, but I may be pardoned in saying that they seem to be much appreciated by nearly all the leading stock-growers of the country, and that the American Herd-Book has already a list recorded of over 60,000 well bred animals.

In the department of swine we had a very fine show of animals; and, while recognizing fully the good qualities of all, and without disparagement of others, would note a list comprising twenty-seven pure blood Poland China hogs, by an exhibitor from this county. A number of these animals had been awarded first and second prizes at the Northern Indiana Fair of 1875, and also at the Michigan State Agricultural Fair at Jackson in 1876.

While alluding to the enterprise and general progress that has been made and is going on in the various branches of agriculture in our county, and the fact that we have already won enviable distinction in the line of stock growing, as well as in the various products of the field, the garden, and the orchard. It is also proper to state in this connection that it is but a short time, comparatively, since one of our prominent farmers, whose broad acres lie within the borders of this county, won the first premium offered by the Michigan State Agricultural Society for the largest and best cultivated farm in the State.

I will now call your attention more particularly to the immediate business and transactions of the past year.

The whole number of entries in the several departments for the fair of 1876 were as follows:

Horses.....	148
Cattle.....	78
Sheep.....	64
Swine.....	56
Poultry.....	47
Grain, vegetables, fruits, and flowers.....	630
Dairy and household, domestic manufacture, and fancy work.....	267
Merchants' goods, paintings, furniture, carriages, implements, etc.....	230
Centennial museum and babies.....	73

Total number of entries..... 1,593

The following is the summary of premiums awarded in the various departments:

Horses—general list.....	\$193 60
“ special list.....	380 00
Cattle.....	192 00
Sheep.....	78 00
Swine.....	47 00
Poultry.....	25 50
Grain, vegetables, fruit, and flowers.....	155 50
Dairy, household, and fancy.....	105 75
Goods, paintings, implements, etc.....	151 00
Special—babies.....	66 00

Total of premiums awarded..... \$1,393 75

Financial statement of receipts and expenditures for the fiscal year ending January 13, 1877:

RECEIPTS.

Advertising in pamphlet '76.....	\$164 00
Rent of stands on the ground.....	131 50
Speed subscriptions.....	220 95

Membership tickets.....	\$322 00
Gate tickets and grand stand.....	1,568 70
Entries, speed, and sweepstakes.....	237 50
Total receipts.....	\$2,644 65

EXPENDITURES.

Paid contingent expenses.....	\$986 31
Paid premium checks.....	1,365 72
Paid D. C. Reed.....	132 29
Balance of cash.....	160 33
Total expenditures and cash.....	\$2,644 65

TREASURY STATEMENT, JAN. 13, 1877.

Balance in treasury Jan. 15, 1876.....	\$1,371 79
Balance from fair of 1876 net.....	160 33
Total cash balance in treasury Jan. 12, 1877.....	\$1,532 12

I would again call attention to the fact that there is now an Association of Agricultural Societies of Michigan, formed and in active operation. A convention was held recently at the city of Jackson. Our Society was duly represented. The range of topics discussed covered nearly the entire ground of points connected with the management and success of the county Societies in general, and elicited the active interest and attention of all the delegates in attendance. The official report of the doings of the convention, it is expected, will appear in the annual report of the Michigan State Board of Agriculture for 1876. The convention adopted various recommendations and suggestions to agricultural societies, among which may be named, "That horse racing at agricultural fairs be discountenanced." "That family, or season tickets of all kinds be discarded." "That premium ribbons and cards be withheld until the last day of the fair." "That games of chance, spirituous and malt liquors and immoral shows be excluded from the grounds;" and that an effort be made by appropriate legislation to link the Agricultural Societies of the State more closely with the Michigan State Board of Agriculture.

While the officers of the Kalamazoo County Agricultural Society have, I think, faithfully endeavored to keep pace with the onward march of events, and avail themselves of such experiences and suggestions as promised the best results; and while I feel that I am warranted in claiming for our Society during its later years, a management that will compare favorably with the other societies of the State, still it is but fair to say that perfection is not reached, nor is it claimed, by any means; but on the contrary, there are many features pertaining to the organization and carrying out of the details of the fair, that it seems difficult to adjust upon an entirely satisfactory basis.

So long as money is required for admission at the gates, so long as premium lists do not provide, and viewing committees award, I had said, a *first* prize to each and every exhibitor, so long as any considerable number of the farmers of the county only attend and participate in the annual exhibitions of the Society in consideration of such pecuniary inducements as may chance to be offered in

the schedule of prizes, just so long will there be unfriendly criticisms, and we shall come short of giving full and perfect satisfaction.

While there has been a very gratifying unanimity of opinion and concert of action on the part of the executive board, and of the superintendents of the various departments without disagreement as to the general interpretation of rules, still I have thought that in reference to a number of the classes embraced in the premium list it would not only be advantageous to the superintendents but also to exhibitors to append explanatory notes at the bottom of all such classes where doubts could arise, clearly defining the scope and conditions upon which any prize is based; such rules to be carefully considered, and having been adopted, to be adhered to, until changed or repealed by the Executive Board.

Officers were elected for the ensuing year, as follows:

President—W. H. Cobb.

Secretary—Frank Little.

Treasurer—Wm. H. McCouster.

LAKE COUNTY.

In accordance with the directions set forth in the compiled laws of 1871, we the undersigned would respectfully submit the following report of transactions of Lake County Agricultural Society for the year 1876:

At the annual meeting held January 18, 1876, the following officers were chosen:

President—Ralph H. Hollister.

Vice-President—Nelson H. McKee.

Treasurer—Wm. A. Deuress.

Secretary—Chas. K. Radcliffe.

Directors, for three years—John J. Robertson, Dover; Henry S. Jenks, Lake; Frank L. Allen, Pleasant Plains.

It was resolved at this session to purchase a suitable site for a fair ground.

The constitution was amended so as to provide for the election of officers by ballot; the box to be in the hands of tellers appointed for the purpose by the board of directors, on the fair ground, between the hours of two and four o'clock P. M. of the second day of each annual fair, the term of office to commence on the day of the annual meeting, to-wit: the first Thursday in January.

At a special meeting held July 28, 1876, R. H. Hollister, N. H. McKee, Wm. A. Deuress, and C. K. Radcliffe were authorized as a committee to purchase, at a price not exceeding \$200.00, of the F. & P. M. Ry. Co., the southeast quarter of the southeast quarter of section thirty-three, town eighteen north, of range thirteen west.

A building was authorized to be erected when the site had been secured, 24x40 feet, one story high, of rough boards, railroad style, without floor, double doors at each end, the lumber to be "common," and the shingles "No. 2."

The site was secured by the payment of \$50.00 down, the balance (\$150.00) to be paid in three equal yearly payments—interest seven per cent. per annum.

The board of supervisors had voted a tax of \$150.00 for use of the society, which had been paid into the treasury.

It was also resolved at the July session to pay cash premiums at the annual fair of 1876 to amount of the receipts of the exhibition.

The board of directors having previously authorized it, several life membership tickets were issued at \$10.00 each, as will be shown by the report of the treasurer, hereunto annexed.

Two acres of the site for a fair ground were cleared, a tight board fence built upon two sides,—fronting on streets,—and a temporary fence around the remainder. The cost of this work, and payment therefor, is shown in the treasurer's report.

At the annual fair of 1876 the election of officers for the coming year took place, at two o'clock P. M. of the second day. The following were chosen:

President—Ralph H. Hollister.

Vice-President—Nelson H. McKee.

Secretary—Chas. K. Radcliffe.

Treasurer—Lee S. Cobb.

Directors, for four years—Frank Skinner, Pinora township; Henry Saunders, Chase; Newton I. Kinne, Elk; Geo. W. Irving, Glencoe.

All of which is respectfully submitted.

CHAS. K. RADCLIFFE, *Secretary*.

RALPH H. HOLLISTER, *President*.

The report of the treasurer of this society (Wm. A. Deuress) for 1876 shows total receipts, \$416.52; disbursements, \$422.52; balance due treasurer, \$6.30.

OAKLAND COUNTY.

The twenty-eighth annual meeting for the election of officers was held on Saturday, January 15, 1876, at which meeting the following officers were elected:

President—Charles K. Carpenter, Orion.

Secretary—Noah Tyler, Pontiac.

Treasurer—Charles Dawson, Pontiac.

Directors—M. E. Crofoot, Pontiac; T. A. Smith, Commerce; J. K. Tindell, Davisburg; Wm. Saterlee, Birmingham; J. D. Bateman, Walled Lake.

Directors holding over one year.—John Lessiter, Jersey; John H. Smith, Farmington; W. H. Kimball, Pontiac; C. C. McCarty, Pontiac; H. A. Kipp, Highland.

The Board of Directors, at their meeting to revise the premium list for the annual fair of 1876, adopted the same rules as in 1875, and nearly the same schedule of premiums.

The time fixed for holding the fair for 1876 was the 4th, 5th, and 6th of October. The weather during the entire fair was very unfavorable, being cold and blustering, with occasional squalls of rain during the entire time.

The exhibition was good in almost every thing for which a premium was offered, but the display in farming implements was exceptionally good and constituted a very interesting feature of the fair.

Financially the receipts were, as might be expected with such extreme weather, moderate.

Total receipts from all sources during the year.....	\$3,176 08
Total expenses during year, including premiums paid.....	2,135 68
Surplus.....	\$1,040 40

The condition of the society now, compared with five years ago, is most satisfactory. At that time the society was in debt \$8,000, bearing 10 per cent interest, and secured by mortgage on the grounds of the society. During the five years just past \$3,500 of this sum has been paid, together with the annual interest on the whole mortgage. During this time the society has also erected and paid for the following buildings on the grounds:

A floral hall costing.....	\$904 10
Addition to dwelling and stabling.....	108 00
Dining hall 24x72 feet, with ladies' waiting room above, and kitchen 16x24 feet in rear.....	784 44
Making a sum of.....	\$1,796 54

One thousand seven hundred and ninety-six dollars and fifty-four cents expended in permanent improvements in five years.

The wheat crop never looked finer in this county than in May and June, '76, but the result at harvest time was not so good a crop as was anticipated. The growth of straw was large, but the wheat was generally shrunken and of light yield compared with the amount of straw.

Corn was unusually fine on the opening lands in the county, but on the timbered lands was rather a poor crop.

Potatoes was quite a failure throughout the entire county.

The hay crop was very fine. The crop of clover seed was good and is a source of a good revenue to our farmers.

The cultivation of the rutabaga is still on the increase in the county, and in the northeastern part of the county the farmers are making a specialty of raising them for the southern and southwestern market, some 30,000 bushels having been shipped during the last season from the two stations on the Detroit & Bay City Railroad, Orion and Oxford.

C. K. CROFOOT.

SHIAWASSEE COUNTY.

The Shiawassee County Agricultural Association held its seventeenth annual fair on their grounds in Owosso, on the 27th, 28th, and 29th days of September, A. D. 1876.

Considering the weather at the opening, the fair was a success, both as to exhibition of articles and as to attendance.

The total number of entries was 1,344, with a usual fine display of horses, cattle, sheep, and poultry.

Our premium list is kept thoroughly revised; the officers have the confidence of the exhibitors, and the association gets the liberal support of the people.

Floral Hall was filled with works of art, flowers, needle-work, etc., and very handsomely arranged; fruit and vegetables were especially well represented.

The premiums awarded amounted to \$931.25,—total receipts, \$1,353.50. There were 759 members.

The following officers were elected:

President—John W. Dewey, Owosso.

Secretary—N. Baldwin, City of Owosso.

Treasurer—C. A. Osborn, City of Owosso.

Directors—W. G. Morice, Perry; David Parker, City of Owosso; A. Beers, Bennington; E. J. Cook, Shiawassee; Geo. W. Slocum, Middlebury.

N. BALDWIN, *Secretary*.

VAN BUREN COUNTY.

The 26th annual fair was held on the grounds of the society on the 3d, 4th, 5th, and 6th days of October. The entries numbered 1,506, being 46 more than on the previous year. The amount received from all sources was \$1,238.00. The receipts of the previous fair exceeded this amount by \$351.75, which is readily accounted for by the rainy weather during the week of the fair. The show in every department exceeded that of any fair ever held by the society. The interest taken by the citizens of the county is increasing every year.

We have had the usual experience of other societies in "speed premiums," "family tickets," and other eccentricities, but have settled down upon the rule of four tickets for one dollar, one to be taken up by the gate-keeper on every entrance of the holder, and the policy of giving premiums commensurate with values: and that speed simply is no real measure of value, apart from style and action.

Formerly our rules required that the officers be elected on the ground on the second day of the fair, but the usual commotion attending show days prevented the necessary attention which should be given such an important feature of the society, and the rule was changed, and the election now occurs at the annual meeting in January of each year.

Our officers consist of president, vice-president, secretary, treasurer, and a board of twelve directors, six of whom are elected annually, to hold their office for the term of two years. From this board of directors five men are chosen, who, with the president, form a business committee, with power to transact all business which a full board can do.

The officers elected for the coming year are:

President—F. M. Manning.

Vice-President—D. Woodman.

Secretary—A. C. Glidden.

Treasurer—N. M. Pugsley.

Directors—For two years, Samuel Hoppin, Asa Crofoot, Geo. D. Boyce, Geo. W. Bush, Samuel Consalus, J. Kilburn; for one year, C. Erkenbeck, Wm. Markillie, E. H. Simpson, H. S. Harris, C. W. Young, T. W. Valteau.

Our society is incorporated, and owns its grounds, comprising twenty-one acres. We have 150 horse stalls, 100 of which are closed stalls; 100 open double cattle stalls; 80 covered sheep and hog pens. Floral hall is 70x100 feet, with a hall on the second floor 40x100 feet. The grand stand will seat 800 people, and under it, facing the entrance, are eight booths, which are readily rented at \$10.00 each. The dining hall is 30x80 feet. Our grounds and buildings are valued at \$8,000, against which is a debt of \$2,500. Our board of directors are determined to make a success of the coming fair, and are disposed to adopt every measure which promises success.

A. C. GLIDDEN, *Secretary*.

MICHIGAN STATE ASSOCIATION OF AGRICULTURE.

This association met in the city of Jackson, December 14, 1876.

After an address by President Glidden, and the reading of a report by the Secretary, a recess was taken of fifteen minutes, during which time the following delegates, and those that came in afterwards, were enrolled by the Secretary:

Robert G. Baird, Secretary Michigan State Board of Agriculture.
 C. W. Garfield, Secretary State Pomological Society.
 B. B. Baker, Secretary Michigan Central Agricultural Society, Lansing.
 J. H. Warren, Secretary Lenawee County Agricultural Society, Adrian.
 C. K. Carpenter, President Oakland County Agricultural Society.
 G. R. McKay, President; C. S. Hamilton, Secretary; S. T. DeForest, Vice President, Calhoun County Agricultural Society.
 H. C. Sessions, Secretary; E. P. Kelsey, F. S. Jones, Directors, Ionia County Agricultural Society.
 A. F. Wood, A. M. Chapin, Directors, Ingham County Agricultural Society.
 A. M. Tinker, Secretary; Hon. E. Pringle, Dr. Mitchell, B. S. Holcomb, Ed. Robinson, Directors, Jackson County Agricultural Society.
 Thos. Doyle, President Monroe County Agricultural Society.
 W. H. Cobb, President; Frank Little, Secretary, Kalamazoo County Agricultural Society.
 A. C. Glidden, Secretary Van Buren County Agricultural Society.

The committee on order of business reported as follows:

1st—Rules and Regulations.
 2d—Management of Fairs.
 3d—Premiums.
 4th—Special Premiums for Horses.
 5th—Special Features.
 6th—Time of Holding Fairs.
 7th—Relation between State and County Agricultural Societies.
 8th—What legislation, if any, is necessary to promote the interests of Agriculture.
 9th—General Topics.
 10th—Election of Officers.
 Hours of Meetings—At 9 A. M., 1:30 P. M., 7 P. M.

An invitation was extended to all present to take part in the proceedings.

After discussing the subject of admissions at some length, Dr. Mitchell moved that family tickets or tickets of general admission, good through the fair, be discountenanced. The motion was carried.

Mr. Sessions moved that the society recommend as a uniform system the taking of one dollar as an exhibitor's fee and giving him four single admission tickets. As an amendment Mr. Tinker moved that a certificate of membership and four tickets of admission be issued for one dollar, which motion was carried.

The association then adjourned to meet at 7 o'clock P. M.

An evening session at 7 P. M. was held in the county clerk's office.

The first order of business, "Rules and Regulations," was taken up and a general comparison had by the societies in attendance; also the second topic, "Management of Fairs," which brought out a full and interesting discussion of the whole subject of conducting fairs, participated in by nearly all present. The interchange of ideas and illustration of methods in this connection was one of the most useful and valuable features of the convention. All the officers in attendance expressed unqualified satisfaction at the results of the interview.

Mr. Carpenter moved that the selection of viewing committees be under the charge of the executive superintendents. Lost.

Mr. Garfield thought that more attention should be given to the order of

placing articles, especially in fruit, agricultural, and art halls, and moved the following, which was adopted:

Resolved, That it is the conviction of this Association that to better subserve the interests of those who are to be benefited by our annual exhibitions, all articles of the same name entered in the same class should be grouped together.

Mr. Kelsey moved that the convention recommend that animals or articles having received a first prize at any fair should not be eligible for the same prize at any succeeding fair. The motion did not prevail.

Convention then adjourned until 9 A. M.

MORNING SESSION.

Convention opened under the fourth order of business, "Speed Premiums for Horses."

Mr. Sessions moved that it be declared as the sense of this convention that it is not desirable to offer a purse exceeding \$100 in any one class for trials of speed at county fairs. Mr. Wood moved to amend by discarding speed premiums. Dr. Mitchell moved that a simple declaration discountenancing horse racing be made, but his motion was lost. Mr. Sessions offered a substitute as follows, which was adopted:

Resolved, That this association would earnestly protest against the vicious practice of county societies offering large premiums or prizes as speed premiums, and the offering of any premium based on speed alone. But would recommend the offering of liberal premiums for the encouragement of breeding good horses, and that they shall be judged not by speed alone, but by all the qualities that constitute value in the horse for road, carriage, or market purposes.

The subject of special attractions was discussed at some length and a resolution by Mr. Jones, stating that it is for the interest of agricultural societies to offer special prizes as an attraction at the fairs, was carried. Mr. Pringle of this city said he thought it desirable that in the award of premiums the various committees should state their reasons and give to the public the benefit of their observations and make a full exposition of the basis of award.

Mr. Pringle offered the following, which was adopted:

Resolved, That it be recommended to all societies, so far as practicable, to cause the reports of premiums by committees or judges to be read before the close of the fair, in view of the animals or articles judged, to be accompanied by oral explanations from competent persons, showing the reasons for the awards and pointing the lessons of the exhibition.

Time of holding fairs—Mr. Baker moved that the association deem it very desirable that the time of holding fairs be arranged as follows: 1st, township fairs, farmers' clubs; 2d, county fairs; 3d, district fairs; 4th, State Fair. Adopted.

The following letter from the retiring Vice-President was read:

LANSING, Mich., Dec., 11, 1876.

Frank Little, Esq., Kalamazoo, Mich.:

DEAR SIR.—Your card and notices were received some days since. It now looks as though circumstances would deny me the desired privilege of attending the convention, and therefore I write you a few suggestions as to what I think the convention ought, at least, to try to accomplish. And, as we cannot hope to do all at a single meeting, think

First, The convention should take all needed measures to perpetuate and enlarge itself;

Second, To appoint an able committee who will, at once, go about the work of devising and drafting a bill, to be early brought by them to the attention of the approaching session of our Legislature; said bill to contain all the good in all existing laws

relating to agricultural and kindred societies, adding whatever else may be necessary, and expunging whatever ought to be out of present laws, so there will be no friction, but perfect harmony in running all our agricultural, pomological, and stock breeders' societies from the least to the greatest of them. Let such a bill become a law, and repeal all existing ones on the subject;

Third, I hope the convention will devise some effective plan, by law or otherwise, to secure the absolute closing of all entry books at least ten days prior to the first day of the several fairs. This would avoid many grievous mistakes, save great annoyances, economize time and expenses, enable judges to do their work with some intelligent satisfaction to themselves, the society, exhibitors, and visitors. It would then be practical for superintendents in the various departments to systematize, organize, and arrange everything in order. It would afford time for providing required additional accommodations, and, in my judgment, would more than double the real value of every fair in the State. Until this "reform" is brought about, our agricultural and other similar exhibitions must largely be "*shows of anarchy and confusion*." If the State societies will lead, and a few of the older and better of the county and district societies follow in this much needed revolution, it will at once be a glorious victory without bloodshed;

Fourth, Our fairs should be brought to be regarded as "*Institutes of industry and arts*," and should serve a purpose similar to "teachers institutes" in our educational department. To this end all pools and every kind of gambling should be thoroughly interdicted, and every possible facility should be afforded visitors and exhibitors to *study the exhibition* and gain such practical knowledge as will be of great benefit.

Fifth, The time for holding the several fairs is a matter of a good deal of importance, and should be agreed upon by this convention, if possible, and perhaps should be regulated in the law in some manner; for instance, let the first half of September be assigned to all county and smaller societies, the last half to the district and large union societies, and the first half of October to the State Agricultural and Pomological societies, and all merely *equine* organizations, I think, should hold their meetings during the summer, and well in advance of other exhibitions, so as to be out of their way. Hoping the convention will be large, harmonious, and successful, I remain,

Yours truly,

L. B. POTTER.

Mr. De Forest moved

"That it is desirable that the prize ribbons and cards be withheld until the last day of the fair."

Adopted.

Mr. Carpenter offered the following resolution which was unanimously adopted:

Resolved, That it is the sense of this convention that it is detrimental to the interests of County Agricultural Societies, and demoralizing to the community to allow the selling of spirituous or malt liquors upon the grounds during the exhibition, or to allow gambling of any sort, or the selling of prize packages in any form; and we do earnestly recommend that all County Societies in the State adopt rules expressly prohibiting the aforesaid evils.

By Prof. Garfield:

Resolved, That a committee of three be appointed from this convention to whom shall be referred the suggestion in the President's address concerning the State Board of Agriculture. This committee shall be instructed to examine the State law under which our present Board of Agriculture was formed, and shall, if they deem it advisable, draft a bill by which the law shall be so modified as to bring about a more intimate relationship between the Board and the farmers of the State, and so that the Board shall be a most available means of gathering and disseminating the latest and best information upon agricultural topics. Further, that if such draft be made the committee shall take the proper means to secure its adoption at the coming session of the Legislature.

Adopted.

Mr. Kelsey moved that a committee consisting of President Glidden, Secretary Little, and Messrs. Cobb, Sessions, and Potter, be chosen a committee to carry out the provisions of the resolution offered by Prof. Garfield.—Carried.

The Association then proceeded to make choice of officers for the ensuing year, with the following result:

President.—A. C. Glidden, Paw Paw.

Vice President.—E. P. Kelsey, Ionia.

Secretary and Treasurer.—Frank Little, Kalamazoo.

The following resolutions were unanimously adopted:

By Mr. Sessions:

Resolved, That this convention tender its thanks to the officers of this association for the able and impartial manner in which they have discharged their duties; and also to the officers of the Jackson County Agricultural Society for the many courtesies extended this Convention; and to the city papers for kindly publishing the proceedings of this Convention.

Adopted.

By Mr. Doyle:

Resolved, That a copy of the proceedings of this Convention be forwarded to the secretary of each county and district agricultural society of the State, and we would respectfully request each to publish the same in their premium lists for 1877.

A motion was made that the Secretary send a copy of the proceedings to the Secretary of the State Board of Agriculture with the request that he give it a place in the report for the year. Mr. Baird, the Secretary, who was present, promised to grant the request, and in a few words urged the officers of the societies present to make out and send to him a report of their fairs, that his reports might be made valuable to the community.

It was voted to leave the time and place of holding the next meeting to the officers. Dr. Mitchell invited them to come to Jackson again, promising a cordial reception and hearty coöperation. Lansing, Marshall, Kalamazoo and Ionia were also proposed.

At 4 o'clock P. M. the Convention adjourned *sine die*.

A. C. GLIDDEN, *President*.

FRANK LITTLE, *Secretary*.

JACKSON, MICH., December 15, 1876.

REGISTER OF
METEOROLOGICAL OBSERVATIONS

FOR THE YEAR 1876.

TAKEN AT THE

State Agricultural College of Michigan,

BY R. C. KEDZIE,

PROFESSOR OF CHEMISTRY.

LATITUDE $42^{\circ} 42' 24''$; LONGITUDE $7^{\circ} 33' 19''$ WEST OF WASHINGTON.

Height above the Sea, 895 feet.

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	42	60	62	54½	.267	.426	.399	100	82	71	28.965	28.879	28.615	28.819
2	39	49	37	41	.194	.156	.178	81	48	80	28.887	28.983	29.100	28.986
3	24	40	25	29½	.118	.097	.100	93	39	74	29.240	29.250	29.380	29.290
4	12	25	26	21	.075	.100	.123	100	74	87	29.500	29.449	29.211	29.383
5	38	44	39	40½	.103	.241	.238	45	83	100	29.956	28.898	28.917	29.257
6	27	29	27	27½	.112	.106	.147	76	66	100	29.350	29.393	29.437	29.393
7	29	34	32	31½	.124	.155	.162	77	79	89	29.264	29.204	29.138	29.202
8	43	53	56	51	.186	.219	.308	66	54	68	28.901	28.661	28.580	28.713
9	48	52	30	43½	.335	.388	.225	160	100	91	28.645	28.330	28.470	28.381
10	8	11	12	10½	.062	.057	.075	100	79	100	29.011	29.191	29.396	29.199
11	13	18	18	16½	.063	.052	.098	81	52	100	29.365	29.078	28.997	29.146
12	12	18	11	13½	.075	.085	.071	100	84	100	29.097	29.186	29.286	29.223
13	16	21	13	16½	.090	.080	.063	100	71	81	29.424	29.409	29.394	29.409
14	23	31	28	27½	.107	.155	.153	86	89	100	29.165	29.257	29.256	29.226
15	30	35	37	34	.130	.204	.116	78	100	52	29.031	28.967	28.978	28.992
16	32	38	35	35	.162	.207	.204	89	90	100	29.113	29.081	28.916	29.036
17	37	46	40	41	.220	.262	.225	100	84	91	28.873	28.802	28.820	28.831
18	44	51	42	45½	.288	.374	.267	100	100	100	28.588	28.348	28.485	28.478
19	34	37	23	31½	.196	.157	.123	100	71	100	28.539	28.666	28.924	28.709
20	20	26	17	21	.108	.106	.094	100	75	100	29.146	29.193	29.295	29.211
21	12	26	22	20	.075	.123	.085	100	87	72	29.517	29.498	29.442	29.152
22	25	31	35	30½	.135	.174	.204	100	100	100	29.217	28.944	28.871	29.010
23	32	31	27	30	.181	.155	.147	100	89	100	29.055	29.102	29.237	29.131
24	26	26	21	24½	.123	.123	.066	87	87	85	29.385	29.360	29.341	29.362
25	24	27	17	22½	.112	.112	.078	86	76	83	29.092	28.978	29.075	29.048
26	10	30	32	24	.068	.167	.181	100	100	100	29.144	28.868	28.593	28.868
27	37	45	32	38	.199	.182	.181	90	60	100	28.624	28.804	28.924	28.784
28	35	45	51	43½	.204	.299	.348	100	100	92	28.821	28.595	28.546	28.620
29	18	15	11	14½	.098	.071	.071	100	82	100	28.904	29.220	29.484	29.202
30	12	31	28	23½	.075	.119	.117	100	68	76	29.324	29.304	29.142	29.256
31	22	40	38	33½	.101	.097	.123	86	39	53	29.051	28.957	28.851	28.953
Sums	-----	-----	-----	937	4.886	5.257	5.000	2,721	2,397	2,716	-----	-----	-----	901.265
Means	-----	-----	-----	30°.22	.1415	.1696	.1613	88	77	88	-----	-----	-----	29.073
Average					.157			84			-----			

THE MONTH OF JANUARY, 1876.

CLOUDS.						WINDS.						OZONE.		REGISTERING THERM'R.		RAIN AND SNOW.					
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.		Day: 7 A. M. to 2 P. M.		Night: 9 P. M. to 7 A. M.		Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain and melted Snow.	Depth of Snow.
Percent of Cloud.	Kind.	Percent of Cloud.	Kind.	Percent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.										
100	Cu. St.	90	Cu.	100	Cu. St.	E	1 S E	7 S W	24	5	6	65	38								
100	Cu. St.	00	-----	00	-----	W	16 S W	8 W	12	6	8	47	22								
100	-----	70	Cu. St.	00	-----	S W	4 S W	16 W	12	4	6	41	10								
80	Cir. St.	70	Cir. St.	00	-----	N	8 E	8 S E	8	3	5	38	12								
90	Cu. St.	100	Cu. St.	100	Cu. St.	S E	4 S W	8 W	8	4	5	48	32	3 P. M.	6 P. M.			.10			
100	Cu. St.	100	Cu. St.	80	Cu. St.	S W	12 W	7 W	4	5	7	30	15								
100	-----	30	Cir.	100	Cu. St.	S W	4 W	4 S W	8	6	7	40	25								
100	Cu. St.	80	Cu. St.	100	Cu. St.	S W	8 S W	12 S W	12	6	4	58	42								
100	Cu. St.	100	Nim.	100	Nim.	W	3 S	12 S W	16	8	10	54	6	9 A. M.							
20	Cir.	70	Cu.	100	Nim.	S W	20 W	20 S W	16	6	7	13	8								
100	Nim.	90	Cu. St.	100	Nim.	S W	8 S W	4		5	7	20	10								
100	Cu. St.	100	Cu. St.	00	-----		N	8 N	8	8	8	19	8		10 A. M.		.10	1			
100	Cu. St.	100	Cu. St.	00	-----		W	8 S W	4	3	8	21	10								
100	Cu. St.	00	-----	100	Cu. St.	S W	4 S W	16		6	9	31	20								
100	Cu. St.	100	Nim.	100	Cu. St.	S W	12 S W	16 S W	10	4	7	38	28								
60	Cir. St.	100	Cu. St.	100	Nim.	S W	4 S	8 S E	8	3	8	38	32	6 P. M.	10 P. M.			.15			
100	Cu. St.	20	Cu.	100	Cu. St.	S W	12 S W	12 S W	8	6	7	47	32								
100	Nim.	100	Nim.	00	-----		S W	4 S W	8	4	8	54	39	6 A. M.							
100	Nim.	100	Cu. St.	100	Nim.	S W	8 S W	16 S W	4	6	7	36	18								
100	Nim.	40	Cu.	00	-----	S W	1 S W	8 S W	4	5	6	26	6		12 M.		.85	1			
60	St.	100	Cu. St.	100	Cu. St.		E	8 E	4	6	9	28	10								
100	Nim.	100	Cu. St.	100	Nim.	S E	8 S E	12 S E	8	5	7	32	21	7 A. M.				$\frac{1}{4}$			
100	Nim.	100	Cu. St.	100	Cu. St.	W	8 W	8 N W	4	4	6	32	25		8 A. M.		.05				
100	Cu. St.	100	Cu. St.	00	-----	N W	8 W	4 S W	4	5	8	26	16								
100	Cu. St.	100	Cu. St.	00	-----	S W	4 W	16 S W	12	4	7	27	9								
00	-----	100	Cu. St.	100	Nim.		S E	8 S E	14	7	8	42	10	8 P. M.							
70	Cir. St.	50	Cir.	00	-----	S W	4 S W	12		6	7	48	28		6 A. M.		.12				
100	Nim.	100	Cu. St.	00	-----		S W	6 S W	14	8	6	52	18	5 A. M.			.19				
100	Nim.	60	Cu.	30	Cu.	W	18 W	26 N W	10	7	7	18	6		10 A. M.		.07				
00	-----	00	-----	00	-----	S E	4 S W	12 S	10	6	6	32	10								
10	St.	90	Cu. St.	70	Cu. St.	S	6 S W	8		4	3	40	20								
2390	-----	2260	-----	1780	-----							165	214	1141	586			1.63	2 $\frac{1}{4}$		
45	-----	73	-----	57	-----							5.32	6.90	36°.81	18°.90						

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.			BAROMETER REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	35	39	11	28½	.162	.173	.071	80	73	100	28.674	28.507	28.780	28.983
2	2	12	10	8	.048	.068	.068	100	80	100	29.176	29.319	29.267	29.254
3	10	18	17	15	.068	.098	.094	100	100	100	29.181	29.065	28.984	29.076
4	8	16	8	10½	.062	.043	.062	100	48	100	29.223	29.398	29.519	29.380
5	5	27	27	19½	.055	.093	.111	100	63	75	29.540	29.477	29.299	29.438
6	30	45	40	38½	.148	.160	.160	89	53	64	29.151	29.071	29.088	29.101
7	33	38	31	34	.168	.165	.174	89	72	100	29.344	29.356	29.400	29.366
8	21	44	34	33	.113	.265	.175	100	92	89	29.344	29.296	29.206	29.282
9	35	39	33	35½	.204	.238	.188	100	100	100	28.934	28.653	28.799	28.795
10	32	48	50	43½	.181	.335	.361	100	100	100	28.952	28.753	28.609	28.771
11	41	44	29	38	.257	.265	.123	100	92	77	28.632	28.812	29.012	28.818
12	32	48	36	38½	.143	.165	.170	79	49	80	29.071	29.004	28.981	29.018
13	35	57	44	45½	.183	.191	.289	90	41	100	28.893	28.732	28.558	28.727
14	32	53	29	31½	.181	.131	.142	100	70	88	28.588	28.712	28.774	28.691
15	21	24	21	22	.113	.111	.096	100	86	85	28.694	28.653	28.604	28.983
16	19	21	22	30½	.103	.096	.118	100	85	100	28.891	28.896	28.966	28.917
17	22	31	22	25	.101	.100	.101	86	57	86	29.047	29.075	29.093	29.071
18	18	41	35	31½	.098	.064	.142	100	25	70	29.193	29.122	28.999	29.104
19	32	35	28	31½	.088	.108	.135	49	53	88	29.017	29.054	29.100	29.053
20	26	41	33	33½	.105	.084	.113	75	33	60	29.297	29.299	29.452	29.349
21	36	41	24	33½	.212	.235	.094	100	91	73	29.030	28.730	29.035	28.931
22	24	26	9	19½	.094	.141	.065	73	100	100	29.097	28.945	29.181	29.074
23	0	14	8	7½	.044	.051	.063	100	63	100	29.417	29.412	29.390	29.406
24	11	27	21	19½	.071	.093	.113	100	63	100	29.272	29.163	29.116	29.183
25	18	41	32	30½	.098	.126	.143	100	49	79	29.055	29.098	29.091	29.081
26	25	39	29	31	.117	.131	.123	87	55	77	28.940	28.993	29.041	28.991
27	22	23	22	22½	.118	.106	.118	100	86	100	28.997	28.916	28.775	28.896
28	24	24	25	24½	.129	.129	.117	100	100	87	28.663	28.892	28.973	28.842
29	20	25	24	23	.108	.117	.129	100	87	100	29.241	29.270	29.243	29.251
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sums	-----	-----	-----	794	3.482	4.084	3.857	2,697	2,056	2,578	-----	-----	-----	842.832
Means	-----	-----	-----	27°.38	.1201	.1407	.1330	93	71	89	-----	-----	-----	29.063
Average -----					.1312			84			-----			

THE MONTH OF FEBRUARY, 1876.

CLOUDS.						WINDS.						OZONE.		REGISTERING THERM'R.		RAIN AND SNOW.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.				Day: 7 A. M. to 2 P. M.	Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain and melted Snow.	Depth of Snow.
Per cent of Cloud.	Kind.	Per cent of Cloud.	Kind.	Per cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
100	Cu. St.	100	Nim.	100	Nim.	----	0	W	14	NW	20	5	6	41	-1	2 P. M.	Night	.152	---
00	-----	00	-----	100	Cu. St.	NW	14	W	6	SW	7	4	6	16	7	-----	-----	-----	-----
100	Cu. St.	100	Nim.	100	Cu. St.	S	6	SW	6	SW	5	7	9	21	8	10 A. M.	4 P. M.	.10	---
80	Cu. St.	30	Cu.	100	Cu. St.	SW	16	SW	12	----	0	6	9	16	5	-----	-----	-----	-----
10	St.	10	Cir. St.	00	-----	SW	4	S	12	S	12	3	7	30	5	-----	-----	-----	-----
20	Cir. St.	10	Cir.	00	-----	S	12	S	16	S	16	6	7	47	30	-----	-----	-----	-----
100	Cu. St.	90	Cir. St.	10	Cir.	SW	8	----	0	----	0	6	2	38	29	-----	-----	-----	-----
00	-----	60	Cir. St.	100	Cu. St.	----	0	----	0	----	0	5	10	47	21	Night	-----	-----	-----
100	Nim.	100	Nim.	100	Cu. St.	N	4	N	6	N	4	7	9	40	32	-----	-----	-----	-----
100	Nim.	100	Nim.	60	Cu. St.	SE	4	S	8	SW	8	6	8	57	32	Night	8 A. M.	.98	---
100	Cu. St.	10	Cu.	00	-----	SW	8	W	12	----	0	3	6	45	26	-----	6 A. M.	.52	---
00	-----	10	Cir.	100	Cu. St.	W	4	S	8	----	0	4	8	50	32	-----	-----	-----	-----
90	Cu. St.	20	Cir. St.	100	Nim.	E	4	SE	10	----	0	7	10	59	32	8 P. M.	Night	.41	---
100	Cu. St.	90	Cu. St.	100	Cu. St.	SW	12	SW	12	SW	4	6	3	35	21	-----	-----	-----	-----
100	Cu. St.	100	Nim.	100	Nim.	NW	8	W	12	W	12	5	6	29	19	9 A. M.	-----	-----	-----
100	Nim.	100	Nim.	100	Nim.	W	16	W	12	SW	12	6	7	23	19	Night	-----	.05	---
100	Cu. St.	90	Cir. St.	00	-----	SW	12	SW	16	W	8	7	7	32	16	-----	-----	-----	-----
10	Cir. St.	40	Cu.	10	Cir.	----	0	SW	8	S	12	7	6	41	18	-----	-----	-----	-----
10	St.	00	-----	00	-----	W	16	W	32	W	8	3	7	39	19	-----	-----	-----	-----
00	-----	10	Cir.	50	St.	E	6	----	0	SE	8	5	7	42	23	-----	-----	-----	-----
100	Cu. St.	100	Nim.	30	Cu.	SE	12	S	12	NW	16	8	7	42	20	-----	-----	-----	-----
100	St.	100	Nim.	20	St.	SW	8	W	12	NW	16	8	9	33	0	-----	-----	-----	-----
20	Cu.	20	Cu.	50	St.	NW	8	NW	20	W	8	4	8	14	0	-----	-----	-----	-----
100	Nim.	5	St.	00	-----	SE	21	SE	4	SE	6	7	8	30	11	5 A. M.	12 M.	.14	---
40	Cir.	60	Cir. St.	00	-----	E	3	W	6	E	6	7	7	43	18	-----	-----	-----	-----
60	Cir. St.	20	Cir. St.	70	Cu. St.	NE	4	NE	8	NE	8	5	8	40	21	Night	-----	-----	-----
100	Nim.	100	Nim.	100	Cu. St.	NE	8	NE	12	NE	8	8	9	23	21	Night	5 P. M.	.36	---
100	Cu. St.	100	Nim.	100	Cu. St.	NE	4	NE	12	N	12	6	8	28	20	-----	4 P. M.	.33	---
100	Cu. St.	100	Cu. St.	100	Cu. St.	NW	10	NW	12	----	0	6	7	27	21	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1940	-----	1675	-----	1700	-----	-----	-----	-----	-----	-----	-----	167	211	1028	526	-----	-----	-----	-----
67	-----	58	-----	59	-----	-----	-----	-----	-----	-----	-----	5.76	7.27	35°.45	18°.14	-----	-----	3.042	---

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	22	23	13	19½	.118	.123	.078	100	100	100	29.240	29.134	29.203	29.192
2	13	31	22	24½	.078	.137	.118	100	78	100	28.420	29.427	29.432	29.093
3	8	37	23	22½	.062	.116	.107	100	52	86	29.403	29.414	29.378	29.398
4	21	44	35	33½	.113	.129	.142	100	44	69	29.336	29.244	29.174	29.251
5	40	42	43	41½	.181	.199	.254	73	74	91	29.113	29.087	29.067	29.089
6	48	57	56	53½	.166	.378	.308	49	81	68	29.056	28.995	29.908	29.319
7	46	34	27	35½	.311	.262	.129	100	84	88	28.766	28.688	28.855	28.769
8	23	33	29	28½	.107	.168	.142	86	89	88	29.056	29.056	22.051	29.051
9	29	38	34	33½	.142	.123	.155	88	53	79	29.050	29.013	28.951	29.004
10	36	58	50	48	.170	.422	.309	80	87	85	28.914	28.799	28.788	28.833
11	54	48	34	45½	.418	.335	.196	100	100	100	28.808	28.805	28.959	28.851
12	29	30	25	28	.160	.167	.117	100	100	87	28.993	29.011	29.065	29.025
13	12	29	15	18½	.075	.160	.086	100	100	100	29.187	29.264	29.339	29.263
14	12	28	24	21½	.075	.136	.112	100	88	86	29.430	29.411	29.345	29.062
15	21	29	25	25	.096	.142	.117	85	88	87	29.334	29.266	29.073	29.224
16	29	36	33	32½	.160	.212	.188	100	100	100	28.566	28.096	28.120	28.244
17	24	23	9	18½	.129	.123	.065	100	100	100	28.316	28.594	28.899	28.936
18	2	15	3	6½	.047	.071	.050	100	82	100	29.145	29.283	29.354	29.260
19	0	23	18	13½	.043	.090	.083	100	73	84	29.444	29.426	29.336	29.402
20	17	23	18	19½	.094	.123	.098	100	100	100	29.011	28.698	28.645	28.784
21	15	29	22	22	.086	.142	.118	100	88	100	28.643	28.824	28.982	28.817
22	15	34	27	25½	.086	.103	.129	100	52	88	29.125	29.139	29.153	29.138
23	26	44	29	33	.141	.173	.160	100	59	100	29.129	29.129	29.122	29.193
24	26	37	32	31½	.141	.178	.181	100	80	100	29.043	28.939	28.669	28.883
25	32	38	32	34	.181	.229	.181	100	100	100	28.567	28.471	28.554	28.581
26	32	36	29	32½	.181	.170	.142	100	80	88	28.740	28.769	28.935	28.814
27	26	36	30	30½	.141	.191	.149	100	90	89	29.049	29.059	29.073	29.063
28	24	22	18	21½	.129	.118	.098	100	100	100	28.849	28.692	28.583	28.686
29	20	26	21	22½	.108	.141	.113	100	100	100	28.487	28.476	28.547	28.503
30	25	33	27	28½	.135	.188	.129	100	100	88	28.591	28.869	28.915	28.791
31	24	35	30	29½	.112	.162	.167	86	79	100	29.087	29.153	29.298	29.179
Sums.	-----	-----	-----	944½	4.166	5.415	4.410	2,947	3,001	2,851	-----	-----	-----	896.823
Means	-----	-----	-----	30° 55'	.134	.174	.142	95	97	92	-----	-----	-----	28.929
Average-----					0.150			95			-----			

THE MONTH OF MARCH, 1876.

CLOUDS.						WINDS.						OZONE.		REGISTERING THERM'R.		RAIN AND SNOW.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.		Day: 7 A. M. to 2 P. M.	Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain and melted Snow.	Depth of Snow.
Per cent of Cloud.	Kind.	Per cent of Cloud.	Kind.	Per cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
100	Nim.	100	Nim.	10	Cir.	N E	--	N E	12	N	4	7	8	25	5	-----	5 P. M.	.10	3
10	St.	00	-----	00	-----	---	0	S W	8	S W	4	6	7	33	5	-----	-----	-----	---
5	St.	5	Cu.	00	-----	W	4	W	8	-----	---	8	7	40	4	-----	-----	-----	---
50	Cir. St.	20	Cir.	00	-----	S	8	S	4	S	8	6	5	46	18	-----	-----	-----	---
90	Cu. St.	100	Cu. St.	100	Cu. St.	S	8	S	12	S	8	5	7	48	40	1 P. M.	-----	-----	---
100	Cu. St.	30	Cu. St.	20	Cu. St.	S	12	S	12	S	4	6	7	60	46	-----	6 P. M.	.02	---
100	Nim.	100	Cu. St.	100	Cu. St.	---	0	S W	12	S W	16	7	8	46	22	3 A. M.	9 A. M.	.15	---
100	Cu. St.	60	Cir. St.	70	Cir. St.	N W	12	S W	8	-----	---	6	6	33	23	-----	-----	-----	---
80	Cu. St.	20	Cu. St.	00	-----	E	2	S	8	W	4	5	7	40	29	-----	-----	-----	---
90	Cu. St.	10	Cir. St.	100	Cu. St.	S E	2	S E	4	S E	4	6	6	60	32	In Night	-----	.23	---
100	Cu. St.	100	Nim.	100	Cu. St.	---	0	S W	2	S W	4	7	8	58	29	8 A. M.	-----	-----	---
100	Nim.	100	Nim.	100	Cu. St.	N	4	N	8	N	1	5	3	32	11	-----	4 P. M.	.40	4
30	Cu.	40	Cu.	00	-----	N W	8	N W	16	N W	1	5	7	31	10	-----	-----	-----	---
100	Cu. St.	100	Cu. St.	10	Cir.	N	2	N	4	E	4	6	7	30	12	-----	-----	-----	---
100	Cu. St.	100	Cu. St.	100	Cu.	N E	2	S E	8	S E	8	7	9	30	20	Night	-----	-----	---
100	Nim.	100	Nim.	100	Nim.	N E	8	N E	1	S W	16	8	9	29	21	-----	-----	-----	---
100	Nim.	100	Nim.	100	Cu. St.	S W	8	N W	12	N	8	6	7	26	1	-----	4 P. M.	1.44	4
90	Cir. St.	00	-----	00	-----	N	4	N E	4	-----	---	5	6	18	7	-----	-----	-----	---
00	-----	00	-----	100	Cu. St.	---	--	W	4	S E	2	5	7	24	0	-----	-----	-----	---
100	Nim.	100	Nim.	100	Nim.	N E	2	N E	8	N W	4	7	8	26	12	6:30 A. M.	-----	-----	---
00	-----	60	Cu. St.	00	-----	N W	8	W	20	-----	---	7	4	30	9	-----	Morn.	.25	3
10	St.	10	Cu.	30	St.	W	1	S W	8	S W	4	6	5	38	15	-----	-----	-----	---
00	-----	00	-----	00	-----	---	0	W	2	-----	---	0	5	45	18	-----	-----	-----	---
20	Cir.	100	Cu. St.	100	Nim.	E	1	E	8	N E	8	8	10	40	26	5 P. M.	-----	-----	---
100	Nim.	100	Nim.	100	Cu. St.	N E	4	N	2	N W	8	7	8	40	30	-----	3 P. M.	.75	6
100	Cu. St.	100	Cu. St.	60	-----	S W	12	S W	24	S W	8	6	6	38	24	-----	-----	-----	---
100	Cu. St.	100	Cu. St.	00	-----	W	4	W	8	-----	---	0	6	38	24	-----	-----	-----	---
100	Nim.	100	Nim.	100	Nim.	N E	12	N E	16	N W	12	6	8	26	16	7 A. M.	-----	-----	---
100	Nim.	100	Nim.	100	Nim.	S W	16	N W	16	N W	12	7	8	26	17	-----	-----	-----	---
100	Cu. St.	100	Nim.	90	Cu. St.	N W	16	N W	12	N W	12	5	7	35	18	-----	3 P. M.	1.50	10
100	Cu. St.	100	Cu. St.	90	Cu. St.	W	4	S W	8	-----	---	0	5	37	13	-----	-----	-----	---
2275	-----	2055	-----	1720	-----	---	---	---	---	---	---	191	217	1127	557	-----	-----	4.84	26
73	-----	66	-----	55	-----	---	---	---	---	---	---	806	7.00	36°.35	17°.97	-----	-----	-----	---

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	24	37	28	29%	.129	.157	.153	100	71	100	29.457	29.416	29.302	29.058
2	26	40	33	33	.106	.118	.188	75	47	100	29.317	29.046	28.966	29.110
3	36	39	34	36%	.212	.194	.196	100	81	100	28.831	28.814	28.817	28.820
4	35	45	36	38%	.183	.138	.149	89	45	70	28.895	28.961	28.912	28.922
5	38	40	36	38	.186	.139	.129	81	55	61	28.646	28.822	29.020	28.829
6	32	48	44	38	.162	.121	.151	89	35	52	29.899	29.077	28.947	29.304
7	38	46	34	39%	.165	.125	.139	71	40	71	28.887	29.082	29.118	29.029
8	32	47	33	37%	.181	.090	.188	100	27	100	29.124	29.129	29.176	29.143
9	32	49	41	40%	.126	.153	.190	69	43	73	29.226	29.197	29.148	29.190
10	34	43	41	39%	.139	.278	.257	71	100	100	29.151	29.103	29.101	29.128
11	44	64	54	54	.288	.124	.308	100	20	73	29.033	29.005	28.969	29.002
12	53	71	59	61	.295	.371	.380	73	49	76	28.999	28.873	28.858	28.910
13	56	52	46	51%	.449	.388	.311	100	100	100	28.649	28.556	28.533	28.596
14	47	42	40	43	.273	.199	.160	84	74	64	28.391	28.438	28.618	28.482
15	39	44	40	41	.173	.241	.248	72	83	100	28.691	28.666	28.605	28.654
16	37	42	35	38	.157	.155	.142	71	57	69	28.724	28.760	28.820	28.768
17	35	44	35	38	.128	.155	.128	62	57	62	28.909	28.933	29.086	28.992
18	34	50	39	41	.155	.139	.131	79	38	54	29.191	29.162	29.159	29.170
19	37	56	47	46%	.116	.155	.202	52	34	62	29.295	29.222	29.208	29.241
20	46	63	45	51%	.192	.386	.205	61	67	68	29.024	28.900	29.088	29.004
21	47	63	50	53%	.273	.216	.361	84	37	100	29.206	29.198	29.166	29.190
22	49	63	49	53%	.223	.216	.199	63	37	57	29.102	29.079	29.047	29.076
23	44	51	42	45%	.129	.173	.199	44	46	74	29.131	29.071	29.189	29.130
24	48	55	44	49	.335	.168	.129	100	38	44	29.163	29.159	29.199	29.173
25	38	57	44	46%	.165	.142	.129	71	30	44	29.273	29.270	29.248	29.263
26	43	61	56	53%	.186	.190	.230	66	35	51	29.258	29.125	29.029	29.137
27	53	71	60	61%	.219	.403	.367	54	53	70	28.945	28.748	28.661	28.784
28	51	55	41	49	.245	.120	.147	65	27	56	28.762	28.867	28.945	28.858
29	46	43	36	41%	.125	.164	.149	40	58	70	28.963	28.918	28.860	28.913
30	32	43	33	36	.108	.121	.188	59	43	100	29.003	29.108	29.179	29.096
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sums	-----	-----	-----	1324%	5.822	5.739	6.033	2,185	1,427	2,231	-----	-----	-----	870.012
Means	-----	-----	-----	44°.16	.1940	.1913	.2011	76	48	74	-----	-----	-----	29.000
Average-----					.1954			66			-----			

THE MONTH OF APRIL, 1876.

CLOUDS.						WINDS.						OZONE.		REGISTERING THERM'R.		RAIN AND SNOW.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.		Day: 7 A. M. to 2 P. M.	Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginnings, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain and melted Snow.	Depth of Snow.
Percent of Cloud.	Kind.	Percent of Cloud.	Kind.	Percent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
00	-----	30	Cu.	70	Cir.	---	0 W	8 N W	4	4	8	40	16	Night	-----	-----	-----	-----	
90	St.	100	Cu. St.	100	Cu. St.	E	4 N E	8 N E	4	2	8	42	26	-----	5 P. M.	-----	-----	.20	
100	Nim.	100	Cu. St.	100	Nim.	---	0 S W	8 S W	4	6	9	44	33	-----	-----	-----	-----	-----	
100	Cu. St.	90	Cu. St.	100	St.	S W	4 S W	4 S E	4	7	8	47	32	-----	-----	-----	-----	-----	
100	Cu. St.	90	Cu.	70	Cu.	W	16 S W	16 N W	12	7	7	43	30	-----	-----	-----	-----	-----	
00	-----	00	-----	10	Cir. St.	S W	4 S W	8 S W	12	4	7	52	33	-----	-----	-----	-----	-----	
40	Cu.	10	Cu.	00	-----	S W	24 S W	8	---	0	6	48	29	-----	-----	-----	-----	-----	
00	-----	10	Cu.	00	-----	---	0 S W	4	---	0	5	47	31	-----	-----	-----	-----	-----	
00	-----	00	-----	10	St.	S E	4 S E	4 S E	4	3	7	51	30	-----	-----	-----	-----	-----	
60	St.	100	Cu. St.	20	Cir. St.	S E	8 S	8	---	0	6	52	35	-----	-----	-----	-----	-----	
70	Cir. St.	100	Cu. St.	100	Cu. St.	S	1 S E	4 S E	4	4	4	65	44	In Night	-----	-----	-----	.25	
100	Cu. St.	50	Cu.	30	Cir. St.	---	0 S W	8	---	0	4	3	74	54	7 A. M.	9 A. M.	-----	.25	
100	Nim.	100	Cu. St.	100	Cu. St.	---	0 N W	1 S W	4	4	7	65	45	Morn.	4 P. M.	-----	-----	1.02	
90	Cu. St.	100	Cu. St.	30	Cu. St.	S W	8 S W	20 S W	8	7	6	49	34	In Night	-----	-----	-----	.06	
20	Cir. St.	100	Cu. St.	60	Cu. St.	S W	2 S W	4	---	0	4	8	47	36	9 A. M.	5 P. M.	-----	.20	
10	Cu.	100	Cu. St.	00	-----	N W	4 N W	20 W	4	2	7	43	30	-----	-----	-----	-----	-----	
00	-----	90	Cu. St.	10	St.	W	8 N W	12	---	0	2	6	48	26	-----	-----	-----	-----	
00	-----	40	Cu.	00	-----	N W	8 W	8 W	4	3	6	52	20	-----	-----	-----	-----	-----	
10	Cu.	00	-----	30	Cir. St.	---	0 W	4 S E	8	4	4	56	33	-----	-----	-----	-----	-----	
00	Cu. St.	100	Cu. St.	00	-----	S E	12 S W	16 S W	4	3	3	72	38	-----	-----	-----	-----	-----	
10	St.	10	Cir. St.	100	St.	S W	8 W	12	---	0	2	2	64	46	-----	-----	-----	-----	
100	Cu. St.	100	Cu. St.	20	St.	S	1 W	12 N	8	3	5	68	33	-----	-----	-----	-----	-----	
50	St.	80	St.	20	St.	N	1 S E	4	---	0	0	5	55	32	-----	-----	-----	-----	
20	Cir.	90	Cu. St.	40	St.	N E	4 N E	12 N W	4	1	1	58	28	-----	-----	-----	-----	-----	
00	-----	70	Cu.	10	Cu.	---	0 N W	4	---	0	1	1	63	35	-----	-----	-----	-----	
80	Cu.	100	Cu. St.	100	Cu. St.	S	4 S W	8 S	4	3	3	67	40	-----	-----	-----	-----	-----	
50	Cu. St.	60	Cu. St.	90	Cu.	S	8 S W	12 S E	12	4	5	73	50	Night	-----	-----	-----	.10	
30	Cu.	00	-----	00	-----	N	12 W	24	---	0	4	7	60	34	-----	-----	-----	-----	
90	Cir. St.	100	Cu. St.	00	-----	W	8 W	4	---	0	4	7	50	26	-----	-----	-----	-----	
00	-----	00	-----	00	-----	N	12 N E	12	---	0	2	4	47	22	-----	-----	-----	-----	
1430	-----	1920	-----	1220	-----	---	---	---	---	---	---	111	166	1642	1001	-----	-----	2.08	
48	-----	61	-----	41	-----	---	---	---	---	---	---	3.70	5.53	54° 73	33° 33	-----	-----	-----	

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METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean
1	31	53	43	42½	.136	.123	.142	78	30	51	29.220	29.135	29.128	29.161
2	39	56	48	47½	.195	.230	.285	82	51	85	29.123	29.040	28.975	29.046
3	40	56	46	47½	.160	.179	.311	64	40	100	28.960	28.900	28.820	28.926
4	37	45	42	41½	.178	.204	.267	81	68	100	28.874	28.966	28.905	28.945
5	42	52	50	48	.267	.388	.335	100	100	93	28.910	28.768	28.858	28.845
6	41	51	51	47½	.235	.296	.374	91	79	100	29.016	29.013	28.827	28.952
7	51	51	55	52½	.374	.374	.433	100	100	100	28.759	28.777	28.751	28.764
8	48	51	47	49½	.285	.245	.225	85	65	70	28.769	28.797	28.885	28.819
9	41	58	44	47½	.212	.229	.289	82	47	100	28.849	28.717	28.727	28.764
10	41	56	46	47½	.237	.230	.238	100	51	77	28.790	28.955	29.120	28.955
11	48	50	46	48	.236	.283	.286	70	78	92	29.214	29.164	29.026	29.134
12	46	56	50	50½	.286	.282	.285	92	63	71	29.066	29.110	29.115	29.094
13	48	62	46	52	.236	.340	.262	70	61	84	29.459	29.266	29.248	29.324
14	57	64	57	59½	.348	.403	.268	93	67	58	29.243	29.156	29.042	29.147
15	54	62	51	55½	.231	.370	.321	55	66	86	28.990	29.005	29.097	29.031
16	47	64	57	56	.323	.343	.407	100	57	87	29.140	29.142	29.156	29.146
17	62	82	64	69½	.523	.497	.529	94	45	89	29.060	28.988	29.021	29.023
18	59	76	68	67½	.469	.505	.577	94	56	85	29.077	29.078	29.056	29.070
19	62	75	67	66	.556	.628	.662	100	73	100	29.061	29.023	28.993	29.026
20	65	82	70	72½	.618	.610	.621	100	56	85	28.988	28.889	28.873	28.916
21	69	81	63	71	.599	.585	.543	85	56	94	28.826	28.762	28.736	28.774
22	53	58	47	52½	.375	.309	.179	93	64	55	28.866	29.058	29.203	29.042
23	46	67	59	57½	.215	.333	.469	69	50	94	29.357	29.272	29.283	29.304
24	49	73	53	58½	.297	.283	.269	85	35	67	29.309	29.230	29.198	29.245
25	48	81	59	62½	.285	.403	.410	85	38	82	29.260	29.117	29.101	29.159
26	54	83	62	66½	.362	.308	.370	87	27	66	29.119	29.035	29.016	29.056
27	64	80	69	71	.373	.382	.496	62	37	70	29.037	28.970	28.956	28.987
28	75	81	66	74	.415	.510	.438	48	48	68	29.931	28.903	28.913	28.915
29	74	86	74	78	.429	.302	.363	51	24	81	28.886	28.742	28.831	28.836
30	53	73	58	61	.321	.476	.337	80	59	70	29.002	28.944	28.929	28.958
31	65	85	66	72	.446	.350	.570	77	29	89	28.945	28.911	28.895	28.913
Sums.	-----	-----	-----	1791½	10.222	11.000	11.261	2,543	1,720	2,549	-----	-----	-----	899.277
Means	-----	-----	-----	57° 95	.329	.354	.363	82	55	83	-----	-----	-----	29.009
Average	-----	-----	-----	-----	.349	-----	-----	73	-----	-----	-----	-----	-----	-----

THE MONTH OF MAY, 1876.

CLOUDS.						WINDS.						OZONE.		REGISTERING THERM'R.		RAIN AND SNOW.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Day: 7 A. M. to 2 P. M.	Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain and melted Snow.	Depth of Snow.
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
00	-----	30	Cir. St.	10	Cir. St.	N	4	NW	8	---	0	4	4	57	32	-----	-----	-----	-----
100	Cu. St.	60	Cu.	30	Cir. St.	---	0	NW	4	---	0	2	3	58	31	-----	-----	-----	-----
40	Cir. St.	100	Cu. St.	100	Nim.	---	0	SW	8	SE	8	2	6	60	35	5 P. M.	Night	.18	---
90	Cu. St.	100	Cu. St.	100	Nim.	NW	12	SW	4	---	0	6	6	47	37	9 P. M.	-----	-----	-----
100	Cu. St.	100	Nim.	30	Cu.	SW	4	SE	8	SW	8	7	7	56	40	-----	6 P. M.	.75	---
100	Cu. St.	100	Nim.	100	Nim.	---	0	SE	1	SE	4	4	5	55	40	2 P. M.	-----	-----	-----
100	Cu. St.	60	Cu.	100	Nim.	---	0	SW	4	---	0	4	3	74	47	7 P. M.	1 P. M.	.71	---
90	Cu. St.	100	Cu. St.	100	Cu. St.	SW	4	SW	8	NW	4	3	4	55	39	-----	Night	.62	---
100	Cu. St.	100	Cu. St.	30	Cu. St.	---	0	SW	8	---	0	5	6	61	38	Sh'w-er.	-----	.25	---
100	Cu. St.	60	Cu.	00	-----	NW	12	NW	12	---	0	7	3	59	35	-----	-----	-----	-----
100	Cir. St.	100	Cu. St.	100	Cu. St.	---	0	NE	4	SE	4	2	9	59	43	Sh'w-er.	-----	.21	---
100	Cu. St.	70	Cu.	00	-----	E	4	W	8	---	0	4	6	64	36	-----	-----	-----	-----
00	-----	00	-----	00	-----	NW	8	---	0	---	0	2	4	66	36	-----	-----	-----	-----
20	Cir.	100	Cu. St.	30	Cu. St.	SE	8	SE	1	SE	4	2	2	69	38	-----	-----	-----	-----
70	Cu.	90	Cir. Cu.	90	Cu. St.	N	8	NE	8	SE	8	2	8	68	47	5:30 P. M.	-----	-----	-----
100	Nim.	00	-----	10	Cir. St.	NE	4	SE	8	SE	8	3	5	66	47	-----	Night	.20	---
00	-----	10	Cu.	100	Cu. St.	---	0	NW	12	---	0	2	3	84	56	-----	-----	.05	---
100	Cir. St.	80	Cir. Cu.	50	Cu. St.	---	0	---	0	SE	2	2	3	79	59	Night	Night	1.06	---
100	Nim.	90	Cu.	00	-----	---	0	---	0	---	0	8	4	82	62	-----	-----	-----	-----
90	Cir. St.	90	Cir. Cu.	90	Cu. St.	SW	4	SE	12	SW	8	3	3	86	61	Sh'w-er.	-----	.02	---
90	Cir. Cu.	90	Cu.	50	Cu. St.	SE	1	SW	4	SW	4	2	6	86	53	6 P. M.	Night	.07	---
100	Cu. St.	40	Cu.	00	-----	NW	8	NW	12	NW	4	6	5	62	34	-----	-----	-----	-----
00	-----	00	-----	00	-----	SW	3	SW	2	---	0	3	2	69	40	-----	-----	-----	-----
00	-----	10	Cir.	00	-----	---	0	SW	8	---	0	2	3	77	42	-----	-----	-----	-----
00	-----	20	Cir.	00	-----	SW	1	SW	4	---	0	1	2	84	46	-----	-----	-----	-----
00	-----	5	Cir.	00	-----	SW	1	SW	8	---	0	1	2	85	50	-----	-----	-----	-----
00	-----	10	Cir.	00	-----	SW	2	SW	8	---	0	0	3	85	50	-----	-----	-----	-----
30	Cu.	90	Cir. Cu.	10	Cir.	W	2	W	8	---	0	2	3	85	61	-----	-----	-----	-----
10	Cu.	30	Cu.	00	-----	SW	4	SW	4	N	4	1	5	89	46	Sprinkle.	-----	.01	---
100	Cir. St.	00	-----	00	-----	NE	1	SE	4	SE	4	4	3	75	53	-----	-----	-----	-----
50	Cir. Cu.	00	-----	90	Cu. St.	SE	8	SE	8	S	4	0	0	89	66	-----	-----	-----	-----
1880	-----	1735	-----	1220	-----	-----	-----	-----	-----	-----	-----	96	128	2191	1400	-----	-----	4.13	---
61	-----	56	-----	30	-----	-----	-----	-----	-----	-----	-----	3.10	4.13	70°.68	45°.16	-----	-----	-----	---

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	69	82	69	73%	.599	.572	.671	85	52	95	28.860	28.795	28.880	28.845
2	69	75	61	68%	.599	.628	.505	85	73	94	28.803	28.820	28.837	28.820
3	64	73	52	63	.497	.617	.282	83	77	73	28.786	28.726	28.851	28.794
4	58	59	54	60%	.309	.282	.282	64	58	67	28.860	28.883	28.951	28.898
5	52	63	52	55%	.308	.327	.334	79	57	86	28.986	28.983	29.063	28.991
6	56	69	60	61%	.391	.248	.310	87	35	60	29.019	29.077	29.019	29.038
7	54	74	64	64	.335	.497	.464	80	59	77	29.088	29.041	28.997	29.042
8	70	84	65	73	.551	.604	.549	75	73	89	28.954	28.852	28.732	28.846
9	67	77	68	70%	.591	.457	.543	89	49	79	28.824	28.883	28.923	28.877
10	73	84	73	76%	.617	.641	.510	77	77	63	29.066	29.048	29.031	29.048
11	82	88	70	80	.691	.663	.586	63	67	80	29.067	29.005	29.001	29.024
12	74	91	71	78%	.604	.556	.682	73	37	90	29.082	29.035	29.011	29.043
13	68	83	67	72%	.543	.637	.662	79	56	100	29.015	28.958	28.965	28.979
14	65	70	65	66%	.618	.586	.618	100	80	100	28.980	28.977	28.993	28.983
15	67	77	69	71	.662	.799	.708	100	86	100	29.006	28.970	28.950	28.975
16	68	78	65	70%	.612	.704	.618	90	73	100	28.836	28.765	28.708	28.770
17	69	73	61	67%	.635	.732	.242	90	90	45	28.633	28.588	28.571	28.597
18	53	55	53	53%	.295	.295	.321	73	68	80	28.717	28.714	28.816	28.749
19	51	55	52	52%	.296	.375	.361	79	93	93	28.781	28.807	28.839	28.809
20	52	59	53	54%	.361	.380	.348	93	76	86	28.869	28.856	28.893	28.873
21	57	67	59	61	.466	.425	.469	100	64	94	28.986	29.000	28.999	28.995
22	64	83	68	71%	.563	.637	.612	94	56	90	29.052	29.028	29.013	29.031
23	69	72	69	70	.671	.706	.671	95	90	95	28.938	28.838	28.980	28.919
24	69	88	71	82%	.671	.650	.682	95	49	90	28.918	28.909	28.852	28.920
25	74	88	63	78%	.798	.914	.617	95	95	77	28.773	28.741	28.746	28.753
26	69	88	73	76%	.671	1.111	.758	95	84	90	28.817	28.650	28.725	28.731
27	67	77	67	70%	.662	.717	.522	100	77	79	28.813	28.890	28.940	28.881
28	63	76	63	67%	.510	.470	.510	88	52	88	29.051	29.015	29.046	29.037
29	61	77	59	65%	.456	.422	.500	88	46	100	29.057	28.996	29.038	29.030
30	61	76	61	66	.442	.436	.473	83	49	88	29.077	29.058	29.018	29.051
31	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sums:	-----	-----	-----	2044%	16.024	17.088	15.410	2,577	1,999	2,548	-----	-----	-----	867.329
Means	-----	-----	-----	68°.14	.534	.569	.513	86	66	85	-----	-----	-----	28.911
Average -----					.539			79						

THE MONTH OF JUNE, 1876.

CLOUDS.						WINDS.						OZONE.		REGIST'RING THERM'R.		RAIN AND SNOW.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.	Day: 7 A. M. to 2 P. M.		Night: 9 P. M. to 7 A. M.					Beginning, Rain or Snow.	Endings, Rain or Snow.	Inches of Rain and melted Snow.	Depth of Snow.
Percent of Cloud.	Kind.	Percent of Cloud.	Kind.	Percent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.	Maximum.	Minimum.						
10	Cu. St.	10	Cu. St.	100	Cu. St.	---	0 S W	4 S W	6	0	0	84	68	---	---	---	---	---	---
100	Cu. St.	10	Cu. St.	10	Cir. St.	---	0 S W	4	---	0	2 3	76	54	---	---	---	---	---	---
10	Cu. St.	90	Cu.	10	Cir. St.	S W	1 S W	4	---	0	1 2	80	45	---	---	---	---	---	---
90	Cu.	10	Cu.	10	Cir. St.	N W	5 N W	8 S W	4	2	2	64	45	---	---	---	---	---	---
80	Cir. Cu.	10	Cu. St.	00	---	N W	6 N W	8	---	0	3 3	66	42	---	---	---	---	---	---
90	Nim.	30	Cu.	00	---	---	0 S W	4 N W	4	1	2	82	49	Sh'w-er.	---	---	.03	---	---
90	Cir. Cu.	80	Cir. Cu.	30	Cir. St.	N W	2 S W	4 S	6	2	4	79	55	---	---	---	---	---	---
00	---	10	Cu.	10	Cu. St.	S W	8 S W	12 N E	4	2	6	87	62	9:30 P. M.	10 P. M.	.12	---	---	---
100	Cu. St.	30	Cu.	20	Cu.	S W	4 S W	8 S W	3	4	3	80	62	---	---	---	---	---	---
00	---	10	Cu.	00	---	S W	4 S W	4 S W	3	1	0	93	64	---	---	---	---	---	---
10	Cir.	20	Cu.	00	---	S W	4 S W	8	---	0	1 0	92	59	---	---	---	---	---	---
00	---	60	Cu.	00	---	S W	1 S W	4	---	0	0 3	95	64	---	---	---	---	---	---
20	Cir. St.	100	Nim.	100	Cu. St.	N E	4 S W	8 N W	2	2	3	89	63	2 P. M.	---	---	---	---	---
100	Cu. St.	100	Cu. St.	100	Cu. St.	---	0	---	0	1	0	72	65	---	---	---	---	---	---
100	Cu. St.	90	Cir. Cu.	100	Nim.	---	0 S W	1 S W	1	3	2	80	66	---	---	---	---	---	---
100	Nim.	70	Cu.	100	Cu. St.	S W	1 S	1 S W	2	4	6	82	62	---	---	---	---	---	---
100	Cu. St.	100	Nim.	5	St.	S E	4 S W	12 S W	1	0	3	75	50	---	---	---	---	---	---
100	Cu. St.	100	Cu. St.	60	Cir. St.	S	12 S W	12 S E	4	4	7	59	47	---	---	---	---	---	---
100	Cir. St.	100	Cu. St.	100	Nim.	S E	8 S W	8 S	4	6	6	59	50	---	6 P. M.	3.25	---	---	---
100	Nim.	90	Cu.	5	St.	S W	4 S W	4	---	0	2 1	63	49	---	---	---	---	---	---
00	---	100	Cu. St.	20	Cu. St.	N W	4 S W	8	---	0	2 2	73	57	---	---	---	---	---	---
40	Cir. Cu.	60	Cu.	00	---	---	0 S W	1	---	0	1 1	85	61	Night	---	.05	---	---	---
90	Cir. St.	90	Cir. St.	00	---	S W	2 S W	4	---	0	2 1	83	62	10 A M	11 A M	.48	---	---	---
100	Fog.	5	Cir.	00	---	---	0 W	4	---	0	0 1	91	66	---	---	---	---	---	---
30	Cir.	30	Cu.	00	---	S W	4 S W	8 S W	2	2	2	92	62	---	---	---	---	---	---
10	Cir.	100	Nim.	100	Cu. St.	S W	3 S W	4 S E	4	1	3	90	64	Sh'w-ers.	---	.40	---	---	---
90	Cir. Cu.	80	Cu.	10	St.	S	2 S W	6 S W	2	2	0	81	61	---	---	---	---	---	---
100	Cir. St.	00	---	5	Cir. St.	---	0 S W	6	---	0	1 1	81	54	Sprinkle.	---	.01	---	---	---
60	Cir.	20	Cir. Cu.	00	---	---	0 S W	8	---	0	2 0	82	51	---	---	---	---	---	---
60	Cir.	90	Cu.	10	Cir.	---	0 N W	1	---	0	2 1	78	58	---	---	---	---	---	---
1880	---	1695	---	905	---	---	---	---	---	56	68	2393	1717	---	---	---	---	4.34	---
63	---	56	---	30	---	---	---	---	---	1.87	2.27	79°.76	57°.23	---	---	---	---	---	---

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	64	68	64	65½	.563	.648	.596	94	95	100	28.904	28.974	28.964	28.947
2	73	74	66	71	.732	.758	.604	90	90	94	28.813	28.893	28.741	28.815
3	66	78	68	70½	.604	.704	.604	94	73	94	28.817	28.852	28.903	28.857
4	65	81	65	70½	.618	.624	.583	100	59	94	28.901	28.920	28.963	28.928
5	67	86	73	75½	.639	.666	.563	100	77	94	28.694	28.814	28.966	28.825
6	67	86	73	75½	.626	1.038	.812	95	84	100	28.934	28.989	28.992	28.972
7	76	93	76	81½	.812	.800	.812	91	52	91	29.033	29.035	29.048	29.038
8	77	84	75	78½	.799	.891	.785	86	79	90	29.076	29.037	29.015	29.043
9	82	92	77	83½	.859	.923	.799	79	79	86	29.024	28.967	28.950	28.980
10	78	73	68	73	.841	.771	.648	91	95	95	29.001	28.998	29.016	29.002
11	68	85	75	76	.648	.819	.745	95	68	86	29.037	28.991	29.006	29.011
12	75	87	74	78½	.798	.836	.798	95	65	95	29.039	29.033	29.063	29.045
13	74	90	73	79	.812	.751	.617	91	53	77	29.046	29.005	28.988	29.013
14	71	84	68	74½	.644	.623	.612	86	53	90	28.989	28.984	28.996	28.990
15	67	81	59	69	.522	.474	.469	79	49	94	29.077	29.085	29.105	29.089
16	72	84	71	75½	.489	.433	.572	62	37	76	29.188	29.112	29.102	29.134
17	69	91	76	78½	.599	.340	.812	85	23	91	29.110	29.023	29.049	29.061
18	73	89	73	78½	.732	.778	.732	90	59	90	29.166	29.055	29.071	29.097
19	74	91	75	80	.758	.737	.785	90	51	90	29.056	28.967	28.996	29.003
20	76	79	65	73½	.731	.612	.516	81	62	84	28.739	28.904	29.006	28.883
21	57	77	59	64½	.378	.717	.439	81	77	88	29.201	29.188	29.161	29.183
22	65	71	60	65½	.451	.608	.367	73	80	71	29.082	29.006	29.179	29.089
23	61	71	58	60	.383	.306	.452	71	43	94	29.139	29.117	29.067	29.108
24	54	75	60	63	.349	.363	.338	81	43	65	29.098	29.041	29.064	29.068
25	59	77	61	65½	.352	.356	.505	70	38	94	29.092	29.044	29.064	29.067
26	56	79	68	67½	.449	.501	.612	100	51	90	29.142	29.104	29.096	29.114
27	66	77	70	71	.470	.577	.733	73	64	100	29.004	28.860	28.846	28.903
28	64	82	69	71½	.596	.510	.564	100	48	79	28.916	28.927	28.947	28.930
29	62	79	64	68½	.523	.537	.529	94	54	81	29.068	29.007	29.016	29.010
30	69	84	65	72½	.462	.470	.516	65	40	84	29.036	29.000	29.010	29.012
31	60	85	63	69½	.518	.384	.510	100	32	88	29.058	29.050	29.070	29.059
Sums.	-----	-----	-----	2247	18.757	19.555	19.028	2,682	1,873	2,745	-----	-----	-----	899.276
Means	-----	-----	-----	72°.48	.605	.631	.614	86	60	89	-----	-----	-----	29.009
Average	-----	-----	-----	-----	.617	-----	-----	78	-----	-----	-----	-----	-----	-----

THE MONTH OF JULY, 1876.

CLOUDS.						WINDS.						OZONE.		REGISTERING THERM'R.		RAIN AND SNOW.				
7 A. M.		2 P. M.		9 P. M.		7 A.M.		2 P. M.		9 P. M.		Day: 7 A. M. to 2 P. M.	Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain and melted Snow.	Depth of Snow.	
Percent of Cloud.	Kind.	Percent of Cloud.	Kind.	Percent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.									
100	Cu. St.	100	Cu. St.	100	Fog.	N E	2	N E	4	---	0	3	0	74	64	10 A M	---	---	---	
100	Cu. St.	100	Nim.	90	Cu. St.	S W	8	S	8	S W	9	1	4	75	64	---	7 A. M.	.93	---	
20	Cu.	80	Cu.	100	Cu. St.	N W	4	S W	8	S W	4	3	1	82	64	Show	ers.	.29	---	
100	Nim.	40	Cir. St.	30	Cir. St.	---	0	S W	4	---	0	2	3	81	62	"	"	.15	---	
100	Cu. St.	60	Cu.	00	---	S E	8	N W	12	---	0	2	0	78	57	---	---	---	---	
20	Cir.	40	Cu.	20	Cir.	S W	1	S W	3	---	0	3	1	88	67	---	---	---	---	
100	Cir. St.	20	Cu.	00	---	S W	4	W	4	---	0	1	1	96	72	---	---	---	---	
00	---	30	Cu.	00	---	S W	2	S W	4	---	0	2	0	96	71	---	---	---	---	
00	---	30	Cu.	20	Cir.	S W	2	S W	8	---	0	0	1	95	71	11.30 A. M.	Night	.18	---	
40	Cir.	100	Cu. St.	100	Nim.	S W	1	N E	4	N E	4	2	3	92	66	---	---	---	---	
100	Cu. St.	90	Cu.	5	Cu.	N E	1	S E	4	S E	1	2	0	89	68	---	---	---	---	
100	Fog.	90	Cu.	60	Cir. St.	S W	1	N W	8	---	0	0	0	94	66	---	---	---	---	
00	---	10	Cu.	60	Cir. St.	---	0	S E	2	S W	4	3	0	92	62	---	---	---	---	
30	Cir.	10	Cu.	10	Cir. St.	N W	4	N W	4	---	0	1	2	88	61	---	---	---	---	
30	Cir.	00	---	00	---	N E	4	N W	4	---	0	3	1	79	53	---	---	---	---	
00	---	00	---	00	---	S W	3	S W	4	S W	4	2	4	87	62	---	---	---	---	
20	Cir. St.	90	Cu.	00	---	S W	4	S W	4	---	0	1	0	93	69	---	---	---	---	
40	Cir. Cu.	60	Cu.	10	Cir.	N W	4	N W	3	---	0	1	0	92	65	---	---	---	---	
00	---	70	Cu.	00	---	---	0	S W	4	S W	5	2	4	94	72	---	---	---	---	
10	Cir.	80	Cu.	00	---	S W	4	S W	12	---	0	3	2	84	54	9 A. M.	10 A M	.32	---	
00	---	00	---	00	---	N W	2	N W	4	---	0	2	4	79	57	---	---	---	---	
100	Cu. St.	100	Cu. St.	100	Cu. St.	S W	4	N W	12	N E	8	3	4	82	49	---	---	---	---	
00	---	80	Cu.	30	Cu. St.	N E	8	N E	8	---	0	4	3	75	46	---	---	---	---	
00	---	70	Cu.	00	---	---	0	S W	8	---	0	3	2	79	50	---	---	---	---	
60	Cir.	100	Cir. Cu.	80	Cir. St.	N W	2	W	8	---	0	4	0	78	48	Sprin	kle.	.05	---	
90	Cir.	90	Cir. Cu.	30	Cir. Cu.	---	0	S E	1	S E	5	3	4	82	56	---	---	---	---	
90	Cu. St.	100	Nim.	100	Nim.	S E	4	S W	8	S W	8	5	0	85	60	2 P. M.	Night	.18	---	
70	Cir.	60	Cu.	60	Cir.	S W	1	S W	8	S W	1	2	1	85	55	---	---	---	---	
30	Cir. St.	90	Cir. Cu.	60	Cir. St.	S E	1	S E	2	---	0	1	3	82	53	---	---	---	---	
00	---	80	Cu.	00	---	N E	2	N E	4	N	3	1	1	86	50	---	---	---	---	
00	---	20	Cu.	00	---	---	0	N E	5	---	0	2	0	87	51	---	---	---	---	
1350	---	1890	---	1065	---	---	---	---	---	---	---	67	49	2649	1865	---	---	2.10	---	
44	---	61	---	34	---	---	---	---	---	---	---	2.16	1.58	85°.45	60°.16	---	---	---	---	

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	70	85	70	75	.586	.531	.516	80	44	70	29.128	29.150	29.132	29.137
2	58	87	64	69½	.483	.504	.497	100	39	83	29.181	29.190	29.182	29.168
3	64	84	68	72	.529	.545	.612	89	47	90	29.118	29.095	29.090	29.101
4	74	89	76	77½	.604	.556	.695	74	40	95	29.080	29.013	29.046	29.046
5	70	75	68	71	.695	.705	.658	95	81	90	29.065	29.085	29.047	29.066
6	71	82	70	74½	.720	.816	.695	95	85	95	29.093	29.076	29.100	29.090
7	68	82	63	71	.648	.474	.543	95	45	94	29.158	29.140	29.142	29.147
8	61	86	66	71	.505	.407	.536	94	33	84	29.169	29.124	29.075	29.123
9	68	87	69	74½	.577	.504	.438	85	39	61	29.106	29.068	29.049	29.074
10	73	92	71	78½	.617	.651	.720	77	45	95	29.090	29.050	29.086	29.075
11	71	75	71	72½	.759	.826	.759	100	95	100	29.092	29.055	29.086	29.078
12	71	83	71	75	.759	.802	.759	100	72	100	29.117	29.096	29.106	29.106
13	77	81	74	77½	.758	.745	.758	82	70	90	29.120	29.081	29.051	29.084
14	71	83	72	75½	.720	.759	.785	95	67	100	29.025	28.948	28.944	28.972
15	63	77	64	68	.510	.527	.529	88	53	89	29.035	29.037	29.037	29.036
16	60	79	69	69½	.456	.329	.599	88	33	85	29.078	29.027	29.030	29.045
17	65	84	71	73½	.549	.545	.682	89	47	90	29.046	29.089	29.092	29.076
18	63	83	68	71½	.543	.677	.685	94	60	100	28.943	28.814	28.785	28.847
19	66	83	68	72½	.604	.558	.648	94	50	95	28.833	28.885	28.927	28.898
20	60	73	62	65	.396	.345	.460	76	42	83	29.182	29.186	29.204	29.191
21	51	75	54	60	.321	.318	.418	86	37	100	29.244	29.172	29.174	29.197
22	69	80	69	72½	.671	.523	.708	95	51	100	29.091	29.084	28.976	29.050
23	66	95	71	77½	.570	.778	.720	89	47	95	29.091	28.980	29.004	29.025
24	76	95	76	82½	.772	.728	.812	86	44	91	29.029	29.004	29.075	29.036
25	69	76	58	67½	.635	.382	.365	90	44	76	29.012	29.042	29.097	29.050
26	58	74	56	62½	.394	.370	.336	82	32	75	29.127	29.098	29.142	29.122
27	57	75	56	62½	.322	.318	.363	69	37	81	29.202	29.139	29.142	29.161
28	47	82	63	64	.323	.289	.446	100	26	77	29.159	29.116	29.111	29.129
29	59	74	67	66½	.439	.463	.522	88	56	79	29.099	29.058	29.031	29.063
30	65	80	72	72½	.618	.599	.706	100	59	90	28.944	28.930	29.027	28.967
31	66	90	70	75½	.639	.623	.695	100	44	95	28.946	28.863	28.886	28.898
Sums.	-----	-----	-----	2218	17.712	17.192	18.665	2,774	1,564	2,748	-----	-----	-----	901.048
Means	-----	-----	-----	71° 55	.571	.555	.602	89	50	89	-----	-----	-----	29.048
Average -----					.576			76			-----			

THE MONTH OF AUGUST, 1876.

CLOUDS.						WINDS.						OZONE.		REGISTERING THERM'R.		RAIN AND SNOW.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Day: 7 A. M. to 2 P. M.	Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain and melted Snow.	Depth of Snow.
Per cent of Cloud.	Kind.	Per cent of Cloud.	Kind.	Per cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
00	-----	00	-----	00	-----	---	0 S W	S	---	0	1	0	89	52	-----	-----	-----	-----	-----
00	-----	40	Cu.	10	Cir.	N E	4 S E	4	---	0	3	1	89	56	-----	-----	-----	-----	-----
00	-----	30	Cu.	00	-----	S	4 S E	2 S E	3	1	2	88	64	-----	-----	-----	-----	-----	-----
00	-----	70	Cu.	100	Cir. St.	S E	3 S W	6 S W	1	3	1	94	55	Show	er.	-----	-----	.01	-----
60	Cir.	100	Nim.	00	-----	S E	2 S W	1 S E	2	2	1	81	65	Show	er.	-----	-----	.06	-----
80	Cir. Cu.	90	Cu.	100	Cu.	S W	6 S W	5 S W	2	2	0	86	63	Show	er.	-----	-----	.08	-----
10	St.	20	Cu.	00	-----	---	0 N	1	---	0	1	0	87	50	-----	-----	-----	-----	-----
00	-----	00	-----	00	-----	---	0 S W	2	---	0	2	2	89	58	-----	-----	-----	-----	-----
10	St.	60	Cir. St.	90	Cir. St.	---	0 S W	4 S W	1	4	4	91	63	-----	-----	-----	-----	-----	-----
00	-----	60	Cu.	100	Nim.	S W	1 S W	6 S W	6	1	1	94	69	5 P. M.	-----	-----	-----	-----	-----
100	St.	100	Nim.	30	Cu. St.	---	0 S W	4	---	0	1	0	76	67	-----	Night	-----	.34	-----
100	Fog.	70	Cu.	00	-----	---	0	---	0	---	0	2	0	89	65	-----	-----	-----	-----
10	Cir.	80	Cu.	40	Cir.	---	0 S W	3	---	0	2	4	92	69	-----	-----	-----	-----	-----
00	-----	90	Cu. St.	00	-----	S E	1 S E	4	---	0	4	3	91	63	1 P. M.	5 P. M.	.27	-----	-----
100	Cu. St.	30	Cu.	90	Cu. St.	N E	4 N W	4	---	0	3	1	79	57	-----	-----	-----	-----	-----
60	Cir. St.	80	Cir. Cu.	100	Cu. St.	N W	1 N W	2	---	0	2	1	81	60	-----	-----	-----	-----	-----
100	Cu. St.	60	Cu.	10	Cu. St.	---	0 S W	2	---	0	2	0	87	61	-----	-----	-----	-----	-----
60	Cir.	100	Cir. Cu.	00	-----	---	0 S W	6	---	0	4	2	86	61	3:50 P. M.	5 P. M.	.40	-----	-----
100	Cu. St.	40	Cir.	00	-----	---	0 S W	6 W	4	1	3	83	53	-----	-----	-----	-----	-----	-----
10	Cu.	00	-----	00	-----	N E	5 N E	3	---	0	2	2	74	36	-----	-----	-----	-----	-----
00	-----	00	-----	00	-----	---	0 S W	2	---	0	1	0	77	50	-----	-----	-----	-----	-----
100	Cu. St.	100	Cu. St.	30	Cir.	---	0 S W	3 S W	2	0	3	82	63	-----	-----	-----	-----	-----	-----
40	Cir. Cu.	60	Cu.	00	-----	S W	4 S W	5	---	0	2	0	96	66	-----	-----	-----	-----	-----
80	Cir. Cu.	40	Cu.	10	Cir. St.	S W	2 W	6 S W	1	1	3	96	68	-----	-----	-----	-----	-----	-----
90	Cu.	10	Cir. St.	00	-----	N W	9 N W	12	---	0	2	1	79	56	-----	-----	-----	-----	-----
00	-----	00	-----	00	-----	N W	4 W	10 N W	6	1	1	77	36	-----	-----	-----	-----	-----	-----
50	Cir. St.	30	Cir. St.	5	Cir. St.	---	0 N W	8	---	0	1	0	79	40	-----	-----	-----	-----	-----
00	-----	10	Cir. St.	100	Cir. St.	---	0 N W	4	---	0	3	0	85	47	-----	-----	-----	-----	-----
90	Cir. St.	100	Cir. St.	100	Cir. St.	---	0	---	0	---	0	5	1	79	59	3:30 P. M.	Night	.12	-----
100	Cu. St.	100	Cu. St.	90	Cir.	S W	3 S W	1	---	0	1	1	83	62	-----	-----	-----	-----	-----
00	-----	30	Cu.	00	-----	---	0 S W	6	---	0	1	1	92	65	-----	-----	-----	-----	-----
1350	-----	1610	-----	1005	-----	---	---	---	---	---	---	61	39	2658	1799	-----	-----	1.28	-----
44	-----	52	-----	32	-----	---	---	---	---	---	---	1.97	1.26	85° 74	58° 03	-----	-----	-----	-----

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	65	71	57	64½	.483	.503	.350	78	66	75	28.911	28.928	28.976	28.905
2	47	69	53	56½	.323	.306	.295	100	43	73	29.082	29.074	29.079	29.078
3	53	74	61	62½	.321	.300	.442	80	36	83	29.069	28.971	28.972	29.004
4	57	70	50	59	.436	.323	.361	94	44	100	29.039	29.101	29.155	29.098
5	41	61	54	52	.257	.297	.362	100	55	87	29.212	29.192	29.140	29.181
6	55	54	54	54½	.349	.418	.418	81	100	100	29.043	28.883	28.893	28.940
7	58	69	66	64½	.483	.599	.604	100	85	94	28.877	28.887	28.888	28.884
8	57	72	65	58	.466	.559	.420	100	72	68	28.944	28.881	29.021	28.949
9	54	65	59	59½	.362	.451	.469	87	73	94	29.079	29.019	28.992	29.030
10	57	56	54	55½	.466	.449	.418	100	100	100	28.922	28.899	28.902	28.908
11	55	61	51	55½	.433	.442	.348	100	83	93	28.928	28.940	29.002	28.957
12	46	66	51	54½	.311	.370	.348	100	66	93	29.063	29.105	29.049	29.072
13	42	64	52	52½	.267	.285	.388	100	48	100	28.945	29.115	28.945	29.002
14	44	56	49	49½	.289	.301	.348	100	49	100	28.838	28.835	29.170	28.948
15	47	66	49	54	.323	.407	.348	100	63	100	29.079	29.153	29.195	29.142
16	47	69	52	56	.323	.367	.334	100	52	86	29.269	29.230	29.188	29.229
17	53	67	56	58½	.375	.362	.420	93	55	94	29.156	29.032	28.987	29.058
18	57	72	57	62	.296	.327	.466	79	42	100	28.908	28.907	28.939	28.918
19	45	78	60	61	.300	.514	.518	100	54	100	28.940	28.881	28.888	28.903
20	58	79	65	67½	.483	.264	.483	100	27	78	28.877	28.888	28.906	28.890
21	59	76	62	65½	.469	.591	.523	94	68	94	28.974	29.091	28.998	29.021
22	59	67	61	62½	.500	.556	.537	100	84	100	29.027	28.987	28.981	28.998
23	59	65	55	59½	.500	.451	.433	100	73	100	28.967	28.984	28.991	28.981
24	53	72	56	60½	.403	.455	.449	100	58	100	29.049	29.024	29.027	29.033
25	56	67	52	58½	.449	.556	.334	100	84	86	29.009	28.937	28.989	28.978
26	43	56	42	47	.254	.230	.244	92	51	91	29.003	28.963	29.049	29.005
27	41	56	41	46	.235	.282	.212	91	63	82	29.103	29.037	29.052	29.064
28	48	58	45	43½	.212	.365	.275	63	76	92	28.924	28.769	28.802	28.832
29	44	50	41	45	.289	.234	.112	100	65	82	28.861	28.865	28.912	28.879
30	39	49	43	43½	.216	.199	.231	91	57	83	28.948	28.968	29.022	28.979
31	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
Sums.	-----	-----	-----	1,689	10.873	12.763	11.620	2,823	1,892	2,722	-----	-----	-----	869.866
Means	-----	-----	-----	56° 30	.362	.425	.387	94	63	91	-----	-----	-----	28.995
Average-----					0.391			83			-----			

THE MONTH OF SEPTEMBER, 1876.

CLOUDS.						WINDS.						OZONE.		REGISTERING THERM'R.		RAIN AND SNOW.					
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.		Day: 7 A. M. to 2 P. M.		Night: 9 P. M. to 7 A. M.		Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain and melted Snow.	Depth of Snow.
Per cent of Cloud.	Kind.	Per cent of Cloud.	Kind.	Per cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.										
100	St.	40	Cir. Cu.	00	-----	---	0 N	1 N	4	2	1	77	42	10:30 A. M.	11 A. M.					.03	
00	-----	20	Cu.	00	-----	NW	4 NW	8 NW	2	3	1	75	39								
90	Cu. St.	60	Cir. St.	95	Cu. St.	SW	1 SW	9 SW	8	3	4	77	52	8:30 P. M.	9 P. M.					.10	
00	-----	10	Cu. St.	10	Cir. St.	NW	4 NW	8 NW	1	4	1	73	39								
90	Cir.	100	Cir. St.	100	Cir. St.	---	0 NW	4	---	0	4	63	41								
100	Cu. St.	100	Nim.	100	Cu. St.	SE	4 SE	4 SE	1	3	2	59	53	10 A. M.	5 P. M.					.65	
100	Cu. St.	100	Cu. St.	70	Cu.	---	0	---	0 SW	1	2	0	72	52							
100	Cu.	80	Cu.	100	Cu. St.	---	0 NW	4 NW	4	2	2	76	53								
100	Nim.	90	Cu. St.	100	Cu. St.	NW	1 NE	4 NE	4	2	3	70	53								
100	Cu. St.	100	Nim.	100	Nim.	NE	4 NE	4 NE	2	2	3	58	54	Show ers						.93	
100	Nim.	100	Cu. St.	00	-----	NE	4 NE	4 NW	4	3	0	63	41	Show ers						.70	
5	St.	60	Cu.	00	-----	N	1 NW	4	---	0	3	0	70	37							
10	Cir. St.	100	Cir. St.	00	-----	---	0	---	0 NW	1	3	1	68	57	Night						
100	Nim.	100	Nim.	100	Nim.	NW	2 NW	3	---	0	4	---	59	41	Night					1.22	
00	-----	00	-----	00	-----	---	0	---	0	0	0	68	40								
00	-----	00	-----	00	-----	---	0 NW	4	---	0	1	2	71	42							
00	-----	100	Cir. St.	80	Cir. St.	---	0 NW	8 N	8	3	4	73	50								
90	Cir. St.	10	Cir. St.	00	-----	NW	4 SW	12 SW	4	4	0	73	42								
00	-----	20	Cir.	00	-----	---	0 SW	4	---	0	3	0	79	45							
100	Cu. St.	90	Cir. Cu.	00	-----	---	0 SE	2	---	0	2	3	80	54							
80	Cir. Cu.	60	Cir.	00	-----	SW	1 SW	8	---	0	3	2	76	56							
100	Cu. St.	100	Cu. St.	100	Nim.	NE	1 NE	1 NE	1	1	2	68	59								
100	Nim.	100	Cu. St.	00	-----	---	0 SW	4	---	0	1	0	66	49							
100	Fog.	00	-----	00	-----	---	0 SW	4	---	0	2	0	72	49							
20	Cir.	100	Nim.	5	Cir.	SW	4 SW	4	---	0	1	2	74	41	1 P. M.	5 P. M.				.01	
00	-----	90	Cu.	60	-----	NW	4 NW	8 NW	8	3	4	62	37	Show ers						.01	
5	St.	30	Cu.	00	-----	NW	8 NW	8	---	0	3	3	58	38							
100	Cu. St.	100	Cu. St.	100	Cir. St.	SE	4 SW	8 SW	4	4	3	61	37								
90	Cu. St.	90	Cu. St.	100	Cu. St.	NW	1 NW	4	---	0	3	3	56	38							
100	Cu. St.	100	Cu. St.	100	Cu. St.	NW	1 SW	2 NW	2	4	2	49	36								
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1880	-----	2060	-----	1180	-----	---	---	---	---	---	---	78	52	2066	1361					3.65	
63	-----	69	-----	39	-----	---	---	---	---	---	---	2.60	1.73	68°.87	45°.37						

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER IN OPEN AIR.				PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	43	52	44	46 $\frac{1}{2}$	.231	.257	.265	83	66	92	29.033	28.977	28.954	28.988
2	42	60	51	51	.244	.300	.196	91	85	52	28.866	28.758	28.688	28.737
3	49	55	43	49	.272	.140	.209	78	28	75	28.595	28.645	28.736	28.650
4	39	42	39	40	.216	.199	.173	91	74	73	28.796	28.818	28.852	28.823
5	34	51	43	42 $\frac{2}{3}$	.175	.149	.254	89	41	92	28.864	28.749	28.586	28.733
6	50	44	40	44 $\frac{2}{3}$	.300	.241	.225	85	84	91	28.416	28.556	28.747	28.573
7	34	48	44	42	.175	.143	.265	89	43	92	28.970	28.967	28.854	28.930
8	35	50	33	39 $\frac{1}{2}$	.204	.117	.150	100	32	80	29.100	29.176	29.212	29.163
9	29	57	52	46	.142	.142	.183	88	30	47	29.132	28.807	28.661	28.867
10	34	40	28	34	.155	.139	.153	79	56	100	28.777	28.904	29.029	28.903
11	27	46	27	30	.147	.082	.147	100	26	100	29.280	29.309	29.324	29.304
12	23	48	33	34 $\frac{2}{3}$	.123	.143	.150	100	43	80	29.309	29.211	29.169	29.230
13	32	55	43	43 $\frac{2}{3}$	.162	.120	.254	89	28	92	29.160	29.017	28.955	29.044
14	35	35	26	32	.183	.108	.123	90	53	87	28.955	29.087	29.229	29.090
15	28	39	33	33 $\frac{2}{3}$	.117	.090	.150	76	38	80	29.303	29.245	29.224	29.257
16	29	53	45	42 $\frac{2}{3}$	.123	.123	.117	77	30	39	29.130	28.961	28.916	29.002
17	33	54	34	40 $\frac{2}{3}$	.168	.181	.155	89	43	79	28.994	29.063	29.110	29.056
18	31	63	48	47 $\frac{2}{3}$	.155	.270	.212	89	47	63	29.147	29.063	29.018	29.076
19	43	61	53	52 $\frac{2}{3}$	.186	.216	.269	67	40	67	28.989	28.870	28.837	28.899
20	51	64	48	54 $\frac{2}{3}$	.296	.433	.335	79	73	100	28.715	28.578	28.614	28.636
21	58	63	50	57	.203	.299	.335	42	52	93	28.595	28.675	28.739	28.670
22	51	61	54	55 $\frac{2}{3}$	.321	.333	.418	86	71	100	28.738	28.624	28.614	28.659
23	46	47	41	44 $\frac{2}{3}$	.286	.273	.212	92	85	82	28.589	28.592	28.659	28.613
24	44	43	36	41	.265	.186	.191	92	67	90	28.620	28.647	28.716	28.661
25	38	38	35	37	.186	.186	.204	81	81	100	28.732	28.802	28.880	28.805
26	36	40	27	34 $\frac{2}{3}$	.170	.139	.147	80	56	100	29.036	29.131	29.243	29.137
27	21	43	39	34 $\frac{2}{3}$	.113	.164	.195	100	59	82	29.339	29.250	29.123	29.237
28	41	50	47	46	.248	.162	.298	100	45	92	29.004	29.021	29.021	29.015
29	42	46	44	44	.267	.311	.289	100	100	100	29.031	29.019	29.018	29.023
30	47	61	59	55 $\frac{2}{3}$	.323	.442	.469	100	83	94	29.019	28.956	28.958	28.978
31	51	74	60	61 $\frac{2}{3}$	.374	.563	.487	100	67	94	29.040	29.009	29.027	29.025
Sums.	-----	-----	-----	1356	6.539	6.715	7.230	2,702	1,726	2,608	-----	-----	-----	896.793
Means	-----	-----	-----	43°.74	.211	.217	.233	87	56	84	-----	-----	-----	28.929
Average -----					.220			76			-----			

THE MONTH OF OCTOBER, 1876.

CLOUDS.						WINDS.						OZONE.		REGISTERING THERM'R.		RAIN AND SNOW.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.		2 P. M.		9 P. M.		Day: 7 A. M. to 2 P. M.	Night: 9 P. M. to 7 A. M.	Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain and melted Snow.	Depth of Snow.
Per cent of Cloud.	Kind.	Per cent of Cloud.	Kind.	Per cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
90	Cu.	60	Cu.	00	-----	NW	3	W	4	W	1	0	1	54	40				
00	-----	00	-----	00	-----	SW	4	SW	8	SW	8	3	5	62	42				
100	St.	70	Cir. Cu.	90	Cir.	SW	4	W	8	W	4	3	4	53	38				
90	Cu.	100	Nim.	100	St.	NW	2	W	7	NW	2	4	3	46	32				
50	Cu.	60	Cu.	100	Nim.	---	0	SW	8	SW	6	4	6	54	34	7 P. M.			
100	Nim.	100	Cu. St.	100	Nim.	SW	9	SW	12	NW	8	4	5	50	32	Night		.42	
20	Cu.	30	Cu.	60	Cu.	NW	4	SW	8	SW	12	3	5	51	32				
90	Cu. St.	100	Cu. St.	100	St.	NW	4	NW	10	SW	0	5	4	40	22				
10	Cir. St.	30	Cir. St.	00	-----	SW	6	SW	16	---	20	4	3	56	29				
20	St.	100	Cu. St.	00	-----	---	0	NW	12	---	0	4	4	49	23				
00	-----	30	Cu.	00	-----	SW	4	SW	8	---	0	3	2	48	21				
80	Cir.	100	Cu. St.	00	-----	---	0	NW	4	---	0	3	3	50	23				
20	Cir.	100	Cu. St.	100	Nim.	---	0	SW	4	SW	4	5	5	62	32	4:30 P. M.			
100	Cu. St.	70	Cu.	5	St.	SW	12	N	8	NW	4	4	6	39	22	8 A. M.		.15	
10	Cu.	60	Cu.	90	Cu. St.	N	4	NW	8	NW	3	4	6	43	26				
10	St.	10	St.	20	Cir. St.	NE	6	SW	12	SW	8	6	3	53	29				
00	-----	00	-----	00	-----	---	0	SW	4	---	0	3	5	57	29				
00	-----	00	-----	00	-----	---	0	SE	4	SE	4	3	5	64	30				
50	Cir.	100	Cu. St.	100	Nim.	SE	3	SE	8	SE	4	3	2	69	42	Show er.		.03	
90	Cu.	100	Cu. St.	00	-----	SE	8	SE	8	SE	8	4	3	68	48	Show er.		.15	
00	-----	80	Cu.	00	-----	SW	12	SW	12	---	0	3	2	66	46				
100	St.	100	Cu. St.	100	Nim.	---	0	SE	6	SE	4	3	2	63	45	4 P. M.			
100	Cir. St.	100	Nim.	00	-----	NW	5	NW	8	NW	4	2	1	48	37				
100	Nim.	100	Cu. St.	100	Cu. St.	NW	4	NW	12	NW	8	4	4	46	35				
100	Cu. St.	100	Nim.	100	Nim.	NW	8	NW	8	---	0	5	5	41	34	6 P. M.		.45	
100	Cu. St.	100	Cu.	20	Cir.	NW	8	NW	12	---	0	4	1	41	19				
60	Cir.	90	Cir.	10	Cir.	---	0	NE	8	SE	8	3	0	44	21				
90	Cu.	100	Cir. St.	100	Nim.	SE	4	NE	4	NE	4	3	5	52	40	Night			
100	Nim.	100	Nim.	100	Cir. St.	SE	4	SE	3	SE	3	4	4	47	42				
100	Nim.	100	Cu. St.	00	-----	SW	4	SE	12	S	8	2	2	63	46	11 A. M.		.06	
10	Cir. St.	10	Cu.	100	Cir. St.	---	0	SW	4	---	0	2	2	75	51				
1790	-----	2200	-----	1495	-----							107	103	1659	1042			1.26	
58	-----	71	-----	48	-----							3.45	3.48	53°.52	33°.61				

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.			BAROMETER REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	55	61	56	57½	.433	.473	.420	100	88	94	29.025	28.935	28.811	28.924
2	58	60	40	52½	.337	.310	.203	70	60	82	28.555	28.338	28.618	28.504
3	39	43	38	40	.195	.164	.186	82	59	81	28.810	28.879	28.907	28.895
4	37	46	39	40½	.199	.169	.173	90	54	73	29.210	29.220	29.244	29.225
5	38	50	43	43½	.186	.186	.186	81	51	67	29.278	29.202	29.130	29.203
6	42	46	34	40½	.267	.238	.155	100	77	79	28.701	28.596	28.619	28.639
7	36	40	34	36½	.212	.182	.175	100	73	89	28.718	28.848	28.939	28.835
8	32	35	32	33	.162	.108	.181	89	53	100	28.975	28.984	29.019	28.993
9	25	41	27	31	.135	.126	.147	100	49	100	29.068	29.043	29.074	29.062
10	21	45	29	31½	.113	.182	.160	100	61	100	29.046	28.960	28.956	28.987
11	32	53	39	41½	.162	.244	.173	89	60	73	28.912	28.862	28.908	28.894
12	40	58½	50	49½	.173	.275	.283	73	56	78	28.949	28.928	28.948	29.941
13	51	49	42	47½	.348	.322	.199	93	92	74	28.936	28.989	28.982	28.969
14	30	35	30	31½	.130	.162	.148	78	80	89	29.238	29.149	29.137	29.175
15	28	40	29	32½	.135	.139	.130	88	56	78	29.180	29.183	29.203	29.189
16	30	32	31	31	.148	.162	.136	89	89	78	29.234	29.146	29.130	29.170
17	31	37	37	35	.136	.178	.178	78	81	81	29.151	29.130	29.127	29.136
18	36	42	40	39½	.191	.267	.248	90	100	100	28.991	28.974	28.960	28.975
19	42	46	46	44½	.267	.311	.311	100	100	100	28.966	28.919	28.928	28.938
20	43	43	42	42½	.278	.278	.254	100	100	92	28.966	28.929	28.970	28.955
21	39	46	39	41½	.238	.251	.216	100	84	91	28.927	28.735	28.631	28.784
22	27	32	29	29½	.147	.181	.160	100	100	100	28.805	28.919	28.969	28.894
23	29	33	27	29½	.160	.131	.147	100	70	100	28.980	29.008	29.110	29.033
24	26	27	28	27	.123	.147	.135	87	100	88	29.118	29.010	28.916	29.015
25	38	34	30	34	.229	.175	.167	100	89	100	28.835	28.768	28.789	28.797
26	25	37	29	30½	.135	.157	.160	100	71	100	28.771	28.753	28.700	28.741
27	28	35	29	30½	.153	.168	.160	100	89	100	28.651	28.684	28.725	28.687
28	25	32	28	28½	.135	.143	.153	100	79	100	28.846	28.886	29.014	28.915
29	17	31	25	21	.094	.118	.117	100	68	87	29.083	29.032	29.037	29.051
30	15	19	15	16½	.086	.071	.070	100	69	82	29.078	29.052	29.040	29.057
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Sums.	-----	-----	-----	1090 1.6	5.707	6.018	5.531	2,777	2,258	2,656	-----	-----	-----	868.583
Means	-----	-----	-----	36°.33	.190	.200	.184	93	75	88	-----	-----	-----	28.953
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Average -----				-----	.191			85			-----			

THE MONTH OF NOVEMBER, 1876.

CLOUDS.						WINDS.						OZONE.		REGISTERING THERM'R.		RAIN AND SNOW.			
7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.	7 A. M. to 2 P. M.		2 P. M. to 7 A. M.		Maximum.	Minimum.	Beginning, Rain or Snow.	Ending, Rain or Snow.	Inches of Rain and Melted Snow.	Depth of Snow.	
Per cent of Cloud.	Kind.	Per cent of Cloud.	Kind.	Per cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.								
90	Cir. Cu.	100	Cu. St.	100	Cu. St.	S W	4	0	0	0	3	3	62	51	3.30 P. M.				
100	Nim.	50	Cu.	100	Cu. St.	S W	8	S W	8	N W	8	4	3	61	38	Night		.20	
100	Cu. St.	100	Cu. St.	100	Cu. St.	0	N W	16	N W	8	3	4	44	37					
100	Cu.	100	Cir. Cu.	100	Nim.	0	S W	4	0	4	1	49	37						
90	Cir. Cu.	90	Cir. St.	100	Cir. St.	0	S W	8	S E	8	3	5	53	37	Night				
100	Nim.	60	Cu.	100	Cu. St.	S E	8	S W	4	S W	8	5	4	51	33				
100	Nim.	100	Cu. St.	30	Cu. St.	S W	8	N W	8	N W	4	5	5	41	32	3 P. M.		.33	
100	Cu.	100	Cu. St.	100	Cu. St.	0	N W	8	N W	4	4	4	36	24					
10	St.	00		00		0	N W	8	0	4	2	42	20						
5	St.	30	Cu.	00		0	S E	2	0	3	2	48	21						
60	Cir. St.	00		00		0	S W	6	S E	8	2	2	53	32					
10	Cir.	90	Cir.	90	Cir.	S E	2	S	4	S E	3	4	2	60	38				
90	Cir.	100	Nim.	100	Nim.	S W	4	N W	8	N W	4	2	1	56	30	7 P. M.		$\frac{7}{16}$ in.	
100	Nim.	100	Nim.	50	Cir.	N	8	N E	8	N	8	3	5	37	24				
100	Cu. St.	60	Cu. St.	10	Cu. St.	0		0	0	3	4	41	28		Night		.07		
100	St.	100	St.	100	St.	S	4	S W	4	0	4	4	33	27					
100	St.	100	St.	100	St.	0	S E	4	0	3	2	38	31						
100	St.	100	Nim.	100	Nim.	0		0	0	2	0	44	35		7 A. M.		.24		
100	Nim.	100	Nim.	100	Nim.	0		0	0	0	1	47	41						
100	Nim.	100	Nim.	100	Nim.	0	N E	2	S E	2	3	3	43	39					
100	Nim.	60	Cu. St.	100	Nim.	S E	4	S E	8	S W	8	4	4	47	26	1 P. M.	Night	.021 $\frac{7}{16}$ in.	
100	Nim.	100	Nim.	100	Cu. St.	W	12	W	12	S W	8	6	4	34	26				
100	Nim.	90	Cu. St.	100	Cu. St.	S W	4	S W	12	N W	8	4	3	35	25				
100	St.	100	Nim.	100	Nim.	S W	4	S W	4	0	5	4	32	25					
100	Nim.	100	Nim.	100	Cu. St.	0	N	8	W	8	4	5	37	24					
10	St.	50	Cu. St.	100	St.	0	W	4	S W	8	4	5	30	24					
100	Nim.	100	Nim.	100	Cu. St.	W	1	W	8	S W	8	4	5	35	24	Snow	flurri	cs.	
10	Cu.	100	Cu. St.	100	Cu. St.	W	4	S W	8	S W	4	4	3	33	14				
70	Cu. St.	70	Cu.	100	St.	0	S W	4	S W	4	4	5	35	14					
90	Cu. St.	30	St.	20	St.	N	4	N	12	N	12	4	5	21	12	Snow	flurri	cs.	
2435		2380		2400								107	100	1257	869		.911	1	
81		79		80								3.57	3.33	42° 9	28° 97				

80

METEOROLOGICAL OBSERVATIONS FOR

DAY OF MONTH.	THERMOMETER, IN OPEN AIR.				PRESSURE OF VAPOR, IN INCHES.			RELATIVE HUMIDITY, OR PERCENTAGE OF SATURATION.			BAROMETER, REDUCED TO FREEZING POINT.			
	7 A. M.	2 P. M.	9 P. M.	Daily Mean	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	7 A. M.	2 P. M.	9 P. M.	Mean.
1	12	19	21	17 $\frac{1}{2}$	.075	.087	.113	100	84	100	28.946	28.922	28.979	28.949
2	23	29	22	24 $\frac{1}{2}$	.106	.105	.101	86	66	86	29.018	29.074	29.167	29.096
3	22	39	25	15 $\frac{1}{2}$	.101	.130	.135	86	78	100	29.197	29.259	29.337	29.264
4	11	23	12	17	.071	.117	.075	100	76	100	29.385	29.344	29.337	29.355
5	8	31	22	20 $\frac{1}{2}$	.162	.118	.101	100	68	86	29.309	29.213	29.080	29.201
6	26	38	26	30	.165	.122	.105	75	54	75	28.876	28.776	28.739	28.797
7	20	25	19	21 $\frac{1}{2}$	.108	.100	.107	100	74	100	28.658	28.647	28.719	28.674
8	17	13	6	12	.094	.078	.057	100	100	100	28.551	28.390	28.461	28.469
9	-1	6	-6	-1 $\frac{1}{2}$	.042	.043	.033	100	75	100	28.912	29.041	29.177	29.043
10	-4	4	1	1 $\frac{1}{2}$	.036	.152	.046	100	160	100	29.102	28.964	28.964	29.010
11	-10	19	22	10 $\frac{1}{2}$	.020	.103	.118	100	100	100	28.910	28.674	28.598	28.727
12	27	38	32	32 $\frac{1}{2}$	.129	.123	.143	88	54	79	28.721	28.802	28.638	28.720
13	37	37	32	35 $\frac{1}{2}$	.178	.170	.181	81	80	100	28.647	28.880	28.824	28.784
14	31	33	14	26	.155	.168	.082	69	89	100	28.796	28.798	29.004	28.866
15	10	12	27	16 $\frac{1}{2}$	.068	.045	.123	100	60	87	29.098	28.758	28.424	28.760
16	-5	1	-9	-4 $\frac{1}{2}$	.035	.046	.029	100	100	100	29.224	29.429	29.404	29.352
17	-1	2	5	2	.042	.048	.055	100	100	100	29.394	29.304	29.064	29.254
18	3	20	5	9 $\frac{1}{2}$	.050	.091	.055	100	85	100	29.086	29.135	29.074	29.098
19	13	16	-9	6 $\frac{1}{2}$	.063	.053	.032	81	64	100	29.026	29.146	29.248	29.136
20	3	11	16	10	.078	.074	.074	100	83	83	29.271	29.221	28.964	29.152
21	2	25	23	16 $\frac{1}{2}$	.098	.111	.089	73	86	72	28.861	28.784	28.756	28.891
22	20	19	14	17 $\frac{1}{2}$	.108	.087	.082	100	84	100	28.753	28.792	28.910	28.798
23	15	19	9	14 $\frac{1}{2}$	.086	.087	.065	100	81	100	29.141	29.132	29.392	29.222
24	0	15	14	9 $\frac{1}{2}$	.044	.086	.082	100	100	100	29.480	29.420	29.379	29.426
25	13	26	17	18 $\frac{1}{2}$	.063	.141	.094	81	100	100	29.222	29.078	28.998	29.099
26	7	21	15	14 $\frac{1}{2}$	.060	.113	.086	100	100	100	29.011	28.970	28.935	28.988
27	13	18	11	14	.078	.094	.071	100	100	100	29.063	29.141	29.151	29.120
28	11	21	4	12	.071	.113	.052	100	100	100	29.151	29.098	29.121	29.123
29	17	22	16	18 $\frac{1}{2}$	.094	.118	.090	100	100	100	28.882	28.674	28.719	28.758
30	11	22	18	17	.071	.107	.098	100	86	100	28.858	28.838	29.019	28.905
31	15	22	14	17	.086	.096	.082	100	85	100	29.146	29.142	29.136	29.141
Sums.	-----	-----	-----	472	2.415	3.028	2.652	2,920	2,615	2,998	-----	-----	-----	899.088
Means	-----	-----	-----	15 $\frac{1}{2}$	.079	.098	.086	94	84	97	-----	-----	-----	29.203
Average				-----	.088			92			-----			

THE MONTH OF DECEMBER, 1876.

CLOUDS.						WINDS.						OZONE.		REGISTERING THERM'R.		RAIN AND SNOW.				
7 A. M.		2 P. M.		9 P. M.		7 A. M.	2 P. M.	9 P. M.	7 A. M. to 2 P. M.		2 P. M. to 7 A. M.		Maximum.	Minimum.	Beginning Rain or Snow.	Ending Rain or Snow.	Inches of Rain and melted Snow.	Depth of Snow.		
Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Per Cent of Cloud.	Kind.	Direction.	Force.	Direction.	Force.	Direction.	Force.									
100	St.	90	Cu. St.	100	Nim.	---	0	N W	8	N W	4	5	4	24	12	6 P. M.	9 P. M.	.15	1	
60	Cu. St.	100	Cu. St.	10	St.	N W	8	N W	8	N E	6	4	6	32	15	---	---	---	---	
100	St.	100	Cu. St.	100	St.	N W	6	N W	7	N	4	3	4	32	10	---	---	---	---	
40	St.	80	Cu.	5	St.	---	0	W	6	---	0	4	1	32	7	---	---	---	---	
70	Cu. St.	5	Cu.	00	---	---	0	S W	8	S W	10	2	6	33	8	---	---	---	---	
95	Cu. St.	20	Cir.	00	---	S W	10	S W	12	S W	12	4	3	39	18	---	---	---	---	
50	Cu. St.	100	Nim.	100	Nim.	S W	5	W	5	W	5	4	6	26	16	8 A. M.	---	---	---	
100	Nim.	100	Nim.	100	Nim.	S W	8	S W	13	S W	16	5	5	17	-2	---	9 P. M.	.10	1½	
5	St.	40	Cir. Cu.	00	---	W	20	N W	0	S W	4	6	5	8	-11	---	---	---	---	
40	Cir. St.	100	Nim.	00	---	S E	4	S E	4	---	0	4	3	6	-19	9 A. M.	7 P. M.	.15	3	
40	St.	100	Nim.	100	Nim.	---	0	S E	2	S E	3	7	5	28	-10	1 P. M.	10 P. M.	.12	1½	
100	Cu. St.	60	Cir. Cu.	00	---	S W	2	W	6	S	12	3	5	41	28	---	---	---	---	
90	St.	100	Cu. St.	100	St.	W	8	W	8	W	8	4	5	38	28	---	---	---	---	
100	Cu. St.	100	Cu. St.	00	---	S W	8	S W	16	W	16	5	7	37	6	---	---	---	---	
100	Cu. St.	100	Cu. St.	100	Nim.	S W	8	S W	20	W	20	6	6	27	-7	In	Night.	.08	1	
30	St.	40	Cir. St.	30	St.	W	12	S W	16	N W	0	7	7	1	-11	---	---	---	---	
100	Nim.	100	Nim.	100	Nim.	E	1	N E	4	E	2	4	5	7	-2	5 A. M.	11 P. M.	.50	6	
00	-----	40	St.	00	-----	W	6	W	8	S W	0	4	7	29	2	---	---	---	---	
100	St.	40	St.	00	-----	N W	0	S W	4	---	0	4	5	16	-10	---	---	---	---	
100	St.	100	St.	100	St.	---	0	S E	3	S E	3	4	6	15	-10	---	---	---	---	
100	St.	100	Cu.	100	St.	S W	0	S	1	S	2	4½	4	16	1	---	---	---	---	
100	St.	70	Cu. St.	00	-----	N E	3	N W	8	N W	3	4½	5	24	0	---	---	---	---	
100	Cu. St.	100	St.	00	-----	S W	3	N W	10	---	0	4½	4	20	10	---	---	---	---	
100	St.	100	St.	100	Cu. St.	N W	2	N W	4	N	3	4	5	20	-6	---	---	---	---	
100	St.	100	Nim.	100	Cu. St.	N E	2	N E	5	---	0	5	1	15	0	2 P. M.	5 P. M.	.05	1	
00	-----	100	Nim.	100	Cu. St.	S W	0	S W	8	S W	8	5	5	26	6	---	---	---	---	
100	Cu. St.	100	Cir. Cu.	100	St.	S W	4	S W	5	S W	1	4	2	20	5	---	---	---	---	
100	Nim.	100	Nim.	00	-----	---	0	E	2	---	0	6	7	21	0	7 A. M.	4 P. M.	.05	1	
100	Nim.	100	Nim.	100	Cu. St.	S W	2	N	20	N E	10	7	6	22	4	6 A. M.	5 P. M.	.09	1½	
90	St.	100	Nim.	100	Cu. St.	N W	7	S W	12	W	8	4	3	23	9	---	---	---	---	
100	Nim.	90	St.	100	St.	S W	1	S W	2	S E	2	4	6	22	12	---	---	---	---	
2410	-----	2575	-----	1745	-----	-----	-----	-----	-----	-----	-----	141½	149	717	120	-----	-----	1.29	17½	
78	-----	83½	-----	56	-----	-----	-----	-----	-----	-----	-----	4.57	4.81	23° 13	3° 87	-----	-----	-----	-----	

ABSTRACT OF METEOROLOGICAL TABLES FOR 1876.

MONTHS—1876.	Barometer Reduced to 32°.	Temp. in open Air.	Mean of Max.	Mean of Min.	Per Ct. Cloud.	Relative Humid- ity.	Rain and Snow.	Depth of Snow.	Ozone, Day.	Ozone, Night.
January.....	29.073	39°.22	36°.81	18°.90	58	84	1.63	2¼	5.32	6.90
February.....	29.063	27°.38	35°.45	18°.14	58	84	3.042	-----	5.76	7.27
March.....	28.929	30°.55	36°.35	17°.97	65	95	4.840	26	6.06	7.00
April.....	29.673	44°.16	54°.73	33°.33	51	66	2.080	-----	3.70	5.53
May.....	29.009	57°.95	70°.68	45°.16	52	73	4.130	-----	3.10	4.13
June.....	28.911	68°.14	79°.76	57°.23	50	79	4.340	-----	1.87	2.27
July.....	29.009	72°.48	85°.45	60°.16	46	78	2.100	-----	2.16	1.53
August.....	29.048	71°.55	85°.74	58°.03	43	76	1.280	-----	1.97	1.26
September.....	28.995	56°.30	68°.87	45°.37	57	83	3.650	-----	2.60	1.73
October.....	28.929	43°.74	53°.52	33°.61	59	76	1.260	-----	3.45	3.48
November.....	28.953	36°.33	42°.90	28°.97	80	85	.911	1	3.57	3.33
December.....	29.003	15°.23	23°.13	3°.87	72	92	1.290	17½	4.57	4.81
Average.....	29.049	46°.17	56°.12	35°.06	58	81	-----	-----	4.01	4.11
Total.....	-----	-----	-----	-----	-----	-----	30.553	46¾	-----	-----

Highest temperature for the year..... 96°
 Lowest temperature for the year—December 10..... -19°
 Range of temperature for the year..... 115°

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